Scopes for Establishing a Climate Investment and Finance Standards System in China

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Interim Report for Consultation

Research Consortium of

China International Engineering Consulting Corporation (CIECC)

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Executive Summary

Climate change is the major challenge facing mankind in the 21st century. Over the past 15 years, the Chinese government has adopted a series of industrial policies, fiscal and tax policies to tackle climate change, making remarkable achievements. By 2018, the Chinese government was ahead of schedule in delivering its international commitment to cut carbon intensity by 40-45% from 2005 levels by 2020. However, to achieve the medium - and long-term climate change targets of peaking emissions in 2030 through industrial policies, fiscal and tax policies alone, remains challenging. To truly achieve that goal, it is necessary to fully mobilise the enthusiasm of investors and financial institutions to meet the demand for climate investment and realise efficient use of national and international climate funds.

Therefore, in 2019, the Department of Climate Change (DCC) of the Ministry of Ecology and Environment (MEE) actively coordinated with relevant departments - including the People's Bank of China (PBOC), the China Banking and Insurance Regulatory Commission (CBIRC), National Development and Reform Commission (NDRC) and Ministry of Finance (MoF) to carry out climate investment and finance work. The standardisation of climate investment and finance in China will enhance the effectiveness of financial, investment and fiscal policies in addressing climate change and in achieving climate change targets. Meanwhile, it will support the issuance of policy documents on climate investment and finance, through generating synergy between policies on climate change and those on finance and investment.

At present, the standards system for climate investment and finance is inadequate in China, and it is difficult to provide technical support and institutional guarantees for peaking national and local carbon emissions. There is a lack of unified and enforceable standards for regulatory

authorities, financial institutions, and investors to conduct climate investment and finance. Therefore, there may be an urgent need to establish a portfolio of forward-looking climate investment and finance standards which applies to China's national conditions, to promote the long-term, stable and orderly development of climate investment and financial activities. For this purpose, the MEE has made "accelerating the establishment of a policy standards system for climate investment and finance" one of its priorities in 2020. Studying the requirements of the climate investment and finance standards system is conducive to its development and promotion. Establishing a portfolio of climate finance standards can systematically and dynamically describe the development blueprint of climate investment and the finance industry and help investors to assess the industry development status and trend in a comprehensive way. Yet it can also be used as a basis of retrieval and application for relevant government departments, enterprises institutions, and social organisations. Meanwhile, the climate investment and finance standards system will help enterprises and financial institutions to master the assessment methods of climate benefits and additionality, and set a benchmark for the management of physical climate risks and climate transition risks.

The research team studied 32 national and international green finance standards and other standards related to climate investment and finance. It analysed their components, including industry classification, identification standards and schemes, capital requirements, incentive policies, certification procedures, and post-financing monitoring procedures. The research team also investigated the demand of potential users for climate investment and finance standards through expert seminars and telecom meetings, including national policymaking departments, domestic financial regulatory departments, international and domestic financial institutions, foreign and domestic enterprises, international and domestic climate-friendly investors and other global users. **Through this consulting report, the research team hopes**

that potential international and domestic users can participate in the questionnaire survey and telephone discussions so that we can further understand the needs of prospective standards users and further benefit from opinions of experts.

Climate finance is an essential part of the broader sense of a green financial system, with the early phase results of the research showing that to better serve the government and financial institutions, the construction of China's climate investment and finance standards system should first consider integrating the related standards into China's green financial system, which is currently under development and being improved. It is also suggested that the opinion and comments of potential users and stakeholders should be further solicited. For those standards that play a positive role in promoting the work of climate investment and finance, but are difficult to include in the framework of China's green finance standards system, the research team suggests that relevant standards should be formulated separately under the guidance of the Department of Climate Change, MEE. For the standards that serve international investors or climate-friendly investors, the research team suggests actively encouraging Chinese institutions to develop forward-looking international standards of climate investment and finance through market promotion, to conduct statistical analysis by institutions that research climate investment and finance and be submitted to relevant government departments for the record.

The demands and classification of the stakeholders of the standards system are shown in **Table E-1**.

The interim report presents the following research outputs:

It clarifies the relationship between the climate investment and finance standards system and China's green finance standards system. Based on the close relationship between climate investment and finance and green finance, the team suggests that the

establishment of the climate investment and finance standards system needs to properly handle the relationship with national investment policy, as well as the connection with the green financial standards system, and fully meet the demand of climate investment criteria. Meanwhile, we suggest that climate-friendly projects should be able to be identified and counted under the existing green financial standards, to promote the convergence between green financial products and climate investment and finance products.

A unified method for quantifying climate benefits is proposed as a priority, and "relative quantity" is suggested as the main evaluation index to measure the climate-friendliness. Currently, there is no unified quantitative method for assessing the impact of emission reduction and climate adaptation. For example, the calculation method of emission reduction needs to be clarified, including direct emission (Scope 1) and indirect emission (Scopes 2 & 3). At present, indirect emissions other than energy (Scope 3) are still challenging to quantify, and involve the evolution of attributive life-cycle assessment and attributed life-cycle assessment methods. This assessment method of climate adaptation benefits needs more investment to achieve a unified standard and distribute the implementation of future quantitative standards. The research team suggests that the relative amount of climate benefits, such as emission reduction and climate adaptation improvement, should be taken as the primary evaluation indicators for climate investment and finance criteria, so as to reflect the mitigation and adaptation needs of developing countries fully.

It studies the evaluation of climate investment and finance products and discloses the additionality of climate investment and finance. Green and climate finance generally do not assess additionality - that is to say, investors are unsure about whether the project can be carried out without climate or green labelling. Due to the shortage of climate-friendly finance and related support policies, the climate investment and finance standards system needs to

identify investment with additional climate benefits to share limited concessional funding and policies support opportunities. The research team suggests that the climate investment and finance standards system should distinguish between "climate-friendly statistical products" and "climate-impact products" with additionality. The research team recommend a simplified procedure for the additionality assessment of climate investment and finance, using authoritative institutions for the additionality assessment of a specific region and a specific type of project.

It makes a distinction between climate investment and finance products standards guided by the Chinese government and guided by market users' demands. The government-guided standards mainly meet domestic policy needs, conduct climate investment and finance statistics, and assist investment and financing projects with additionality to connect policies and policy funds. Meanwhile, the research team recommends that we encourage the development of internationally future proof climate investment and finance product standards that meet the needs of international climate-friendly investors driven by market demand.

In terms of the scope for climate investment and finance standards, the research team suggests:

To define and promote "climate credit" as a sub-category of ‘green credit’ as soon as possible. At present, to our knowledge, no country has formally put forward the standard of "climate credit". The research team proposes developing the relevant standards of "climate credit" as sub-standards of "green credit", which includes the following three aspects: (1) create a white list of climate-friendly credit statistics, highlighting projects with climate benefits; (2) establish the "climate impact credit" label to focus on supporting credit finance for projects with additional climate benefits or technological innovation benefits, in combination with policy support and concessional loans or refinancing arrangement offered by climate-friendly

investors; (3) extend the green credit system, establish a "climate blacklist" or "credit climate risk assessment method", and gradually eliminate the climate-vulnerable financing of climate change from the credit system, or increase its financing cost.

Suggest developing "climate bonds" as a sub-type of green bonds. There are currently green bonds known as "climate bonds" in the world, but there are no "climate bonds" with the only focus on climate change issues. The research team recommends the establishment of "China climate bond statistics" and the development of "China climate impact bonds" with prominent additionality as sub-varieties of China's green bonds.

To standardise domestic and international climate/green funds through "climate fund" standards. At present, there is no unified definition of climate funds in the international community, and there is a lack of evaluation and classification standards for climate funds, as well as a certification system for climate fund. It is suggested there is a case for exploring the needs for a standards system of "climate funds" and to encourage authorities to certify domestic and international climate/green funds.

China's climate information disclosure system shall be added to the sub-standards related to environmental information disclosure of China's green financial information disclosure standards. It is suggested that we actively draw on the experience of international standards for climate information disclosure and understand their limitations, and establish a unified, rigorous, climate information disclosure system. It is also suggested that we should explore how to improve mandatory climate information disclosure requirements and levels on a step-by-step basis.

The study suggests formulating China's statistics on climate investment and finance to provide a reference for the international community to establish standardised and unified statistics on climate finance. Currently, there is no unified and scientific statistical

method for calculating climate finance. Therefore, the research team suggests developing a rigorous method for the identification and classification of climate funds according to climate benefits, sources of funds and ways of use. It is suggested there is a strong case for exploring the need to establish statistical standards for climate investment and finance that are complete, consistent, accurate, technical and forward-looking, and applicable to China.

The study suggests developing risk management standards for financial institutions and enterprises, respectively. The next step for the research will be to study the needs of the actuarial departments of insurance companies and the financial institution research department to develop standard methods for integrating climate risk in their models. Meanwhile, we suggest involving studies on how to encourage enterprises to adopt and set a reasonable internal carbon price to avoid the impairment of enterprise assets caused by the risk of climate transformation.

The study suggests the standards system should be actively in line with national and international standards. Is it suggested we strengthen coordination with international standard setters to explore user demand for divesting from fossil energy investment, coal investment,. We recommend excluding fossil energy projects that do not have CCUS (Carbon, Capture Utilisation and Storage) from climate-friendly projects that meet climate investment and financing standards. The study also suggests studying the needs of users on how to ensure that standards related to climate investment and finance do not conflict with related industry and group standards.

After analysing the experiences, limitations and future development trends of national and international standards related to climate investment and finance, the research team suggests that eight basic principles should be explored in the process of China's climate investment and finance standardisation: **i)** user-oriented; **ii)** clear objectives; **iii)** apply unified core principles

but contain distinct levels; **iv)** coherent concept; **v)** well-defined rights and responsibilities; **vi)** consistent quantification; **vii)** climate additionality, and **viii)** commercially viable. The project team proposes to adopt the timelines of China's Five Year Plan (FYP) to carry out the work steadily and complete the construction of China's climate investment and finance standards system through three FYPs from 2020 to 2035 (as shown in Table E-1).

Table E-1 Requirements of China's climate investment and finance standards system and suggestions on completion time

Category	Primary standards		Secondary standards	Timeline
1. separate standards	1.1 Standards system construction work plan (Phase 1)		- Climate investment and finance terminology	Phase 1
			- Classification and industry catalogue	Phase 1
			- Standards coding	Phase 1
	1.2 Climate benefit assessment methods and reporting guidelines (Phase 1)		- Methods for climate benefit assessment	Phase 1
			- Method of additionality assessment	Phase 1
	1.3 Directory of guidance for Nationally Determined Contribution projects (Phase 1)			Phase 1
	1.4 Identification and classification of climate funds (Phase 1)			Phase 1
	1.5 Carbon finance and derivatives standards (Phase 3)			Phase 3
	1.6 Measures for enterprise climate risk management (Phase 2)			Phase 1
2. Linking with other standards	2.1 Link with China's green finance standards system*	Green financial product service standards (Phase 1)	- Climate credit	Phase 1
			- Climate bond	Phase 1
			- Climate fund	Phase 2
			- Climate insurance	Phase 2
		Green credit rating and certification standards (Phase 2)	- Climate credit rating system	Phase 2
			- Assessment method for climate-friendly financial institutions	Phase 1
		Green financial information disclosure standards (Phase 1)	- Climate information disclosure system of listed companies	Phase 1
			- Climate information and benefit disclosure system of financial institutions	Phase 1
			- Disclosure measures for climate benefits of Nationally Determined Contribution projects (key projects)	Phase 1
		Green finance statistics and sharing standards (Phase 1)	- Climate finance statistics monitoring platform	Phase 1
			- Climate finance statistics system	Phase 1
			- Climate benefit statistics	Phase 1
		Management and insurance of green finance risk (Phase 1)	- Measures for climate risk management of financial institutions	Phase 1
			- Regulatory standards for climate risk in financial institutions	Phase 1
	2.2 Link with international standards on climate investment and finance	link with the international ISO/DIS14097 standard (in preparation);		Phase 3
		Link with other international climate-related standards, e.g. the Green Bond Principles (GBP), the Equator Principles (EP4), the Climate Bond Standards (CBS), and climate-related standards/guidelines issued by the World Bank, the Asian Development Bank.		Phase 3
	2.3 Link with other national standards	Link with industrial standards, local standards and enterprise standards related to climate investment and finance.		Phase 1-3

Note：The phases in parentheses are the recommended completion time. Phase 1: "14th FYP"; Phase 2: "15th FYP"; Phase 3: "16th FYP".

* To speed up the work process of climate investment and finance and reduce unnecessary duplication, it is suggested that relevant contents of climate investment and finance should be supplemented in the corresponding sub-standards to be formulated in the framework of "green finance standards system". The work is recommended to be carried out under the direction of the Department of Climate Change, which will review the outcome.

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Cover picture source: VOX CEPR Policy Portal[1]

[1] Kovatashi, K. (2019). Future Design: A new policymaking system for future generations.

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Acronyms

ART	Alternative Risk Transfer
CBI	Climate Bonds Initiative
CBS	Climate Bonds Standard
CCS/CCUS	Carbon Capture, Utilisation and Storage
CDM	Clean Development Mechanism
CME	Chicago Mercantile Exchange Holdings Inc.
CPI	Climate Policy Initiative
DFIs	Development Finance Institutions
EPs	Equator Principles
ESG	Environment, Social Responsibility, Corporate Governance
FSB	Financial Stability Board
GARP	Global Association of Risk Professionals
GBP	Green Bond Principles
GCA	Global Commission on Adaptation
GCF	Green Climate Fund

GEF	Global Environment Fund
I4CE	Institute for Climate Economics
ICMA	International Capital Market Association
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
LDCF	Least Developed Countries Fund
MDBs	Multilateral Development Banks
MRV	Monitoring, Reporting and Verification
NDC	Nationally Determined Contribution
OTC	Over the Counter
PERC	Post Event Review Capability
RCPs	Representative Concentration Pathways
SCCF	Special Climate Change Fund
SDGs	Sustainable Development Goals
TCFD	Task Force on Climate-related Financial Disclosures
UNFCCC	The United Nations Framework Convention on Climate Change

Chapter I. Background

Climate change is one of the most critical and urgent issues in the world. As a responsible country, China has taken active measures to address climate change. During the past 15 years, the Chinese government has adopted a series of industrial, fiscal and tax policies to coordinate a response to climate change. At the same time, the Chinese government has actively participated in international carbon trading through the clean development mechanism (CDM) and has piloted carbon emission trading markets in several provinces and cities across the country. By 2018, China had fulfilled an international commitment to cut its carbon intensity by 40-45% from 2005 levels by 2020, and ahead of schedule. However, it is going to be challenging to achieve the medium - and long-term climate change targets of peaking emissions by 2030 through industrial, fiscal and tax policies alone. It is also going to be necessary to fully mobilise the enthusiasm of investors and financial institutions to meet the demand for climate investment and realise efficient use of national and international climate funds.

Therefore, in 2019, the MEE strengthened its ties with financial regulatory authorities, fiscal authorities and investment authorities to mobilise monetary policies, investment, and fiscal policies to serve climate change better. Meanwhile, the MEE promoted the release of policy documents related to climate investment and finance, so that policies to address climate change can form a synergy with those related to finance and investment, and better promote the realisation of the target of addressing climate change. However, the current national standards system of climate investment and finance lags behind the development needs and fails to play its due role of technical support and institutional guarantee. Specifically, regulators, financial institutions and investors are aware of the importance of climate investment and finance, and international counterparts attach great importance to it. Yet they remain unclear about what standards to adopt to carry out various climate financing work. Given this, to ensure

the long-term, stable and sustainable development of climate investment and finance activities, there is an urgent need to build a set of climate investment and finance standards suitable for China's national conditions. In response to the development needs, the MEE will make **"speeding up the construction of a climate investment and finance policy standards system",** one of the priorities[10] in 2020. That will centre around the implementation of coping with climate change national strategy and implementing the response to climate change and low carbon development goals and exploring the principal elements and needs of the construction of the climate investment and finance standards. At the same time, the approach will involve learning from experience[11] in the development of green finance; the MEE actively promoting the disclosure of climate change information; organising research and releasing the list of the key demonstration projects for supporting NDC goals, technical standards and investment and financing guidelines; and gradually improving the policy system of climate investment and finance.

Studying the requirements of the climate investment and finance standards system is conducive to its development and promotion. To establish a system of climate finance standards can systematically and dynamically illustrate the development blueprint of climate investment and the finance-related industry and help the industry understand the industry development status and trend in a comprehensive way. Yet it can also be used as a basis of retrieval and application for relevant government departments, enterprises and institutions and social organisations. Meanwhile, the climate investment and finance standards system will help

[10] LI G. (2020). Reform and innovation will open up new prospects for climate investment and finance. Speech at the 25th UNCCC "Climate Investment and Finance in China Forum" (改革创新开创气候投融资工作新局面. 在第 25 届联合国气候变化大会"中国气候投融资论坛"上的讲话). Available at: http://iigf.cufe.edu.cn/article/content.html?id=1972

[11] At present, the construction of China's green finance standard system is advancing steadily. In order to meet the development needs of green finance, the green finance standardisation project was put on the agenda in 2017. Since 2018, the green finance standard system has been further refined, providing an important guarantee for standardising the green finance business, ensuring the commercial sustainability of green finance and promoting the green development of economy and society.

enterprises and financial institutions to master the assessment methods of climate benefits, and additionality, and set a benchmark for the management of physical climate risks and climate transition risks.

Chapter II. Analysis of the current situation of relevant domestic and international standards

2.1 Construction of the standards system and its key factors

Standards provide a concrete foundation for promoting economic activities in a healthy way. A sound standard system will incentivise technological innovation and social development and shall lay the cornerstone for modernising a developing country. Although the climate investment and finance standards system discussed in this document refers to a broader sense of standard including industry-wide measures and common practices, it would still be beneficial to understand the formal procedure to establish a narrow sense standard in China.

The Guidelines for Standardisation[12] in China define a **standard** as a document that has been standardised and developed by consensus, in accordance with the standard-setting procedures promulgated by the standard-setting body, to provide rules, guidelines or features for frequent use and reuse of various activities or their results. The formulation process generally includes standard work plan, identify standard items, draft standard, assess the term of validity, final draft, preparation for issuance, formulation process, review, corrigendum, amendment, revision, reprint edition, and new edition. Among them, the term of validity refers to the current length of time of the normative document, that is, the time experienced from the date when the responsible agency of the document decides that it takes effect until the date when it is abolished or replaced.

As the legal basis for standardisation work, the Standardisation Law of the People's Republic of China divided China's standard system into four levels including national standards, industry standards, local standards and enterprise standards, and two types of mandatory standards and recommended standards. Different levels and types of standards are formulated,

[12] GB/T 20000.1-2014. (2014). The Guidelines for Standardisation Chapter 1: standardisation and terminology of relevant activity.

published, and used differently. For instance, the project proposal, organisation, drafting, consultation and technical review of mandatory national standards shall be undertaken by the relevant administrative departments under the State Council according to their functions and responsibilities. Its project approval, serial number and external notification are the responsibilities of the relevant standardisation administrative departments under the State Council, and mandatory national standards shall be approved and promulgated by the State Council.

Standards are the component of a standard system. "Within the established scope, a standard system is a scientific organic whole that comprises of the relevant standards"[13]. A standards system has six characteristics: collectively, targeted, decomposability, relevance, integrity, and environmental adaptability.

The construction of a standards system is a method to guide the standardisation work by using system theory and should clarify the standardisation goal and work around it. **Clear target, complete set, proper level, and clear division** are the basic principles of standard system construction in China. The general methods to construct the standards system include i) to determine the objectives of the standardisation policy; ii) investigation and research; iii) analysis and arrangement; iv) preparation of standard system table; v) dynamic maintenance and update.

China's standards system is divided into several levels and classes, and the relationship between levels and classes of the specific standard system is shown in **Figure 2-1**. National standards, industry standards, group standards, local standards, and enterprise standards represent different classes of standards according to the authoritativeness of the standard issuing authorities; and national general, industry general, professional general, product

[13] GB/T 13016-2018. (2018). Principles and requirements for standard system construction.

standard, according to the applicable field and scope of the standard, on behalf of the different levels of the standards system.

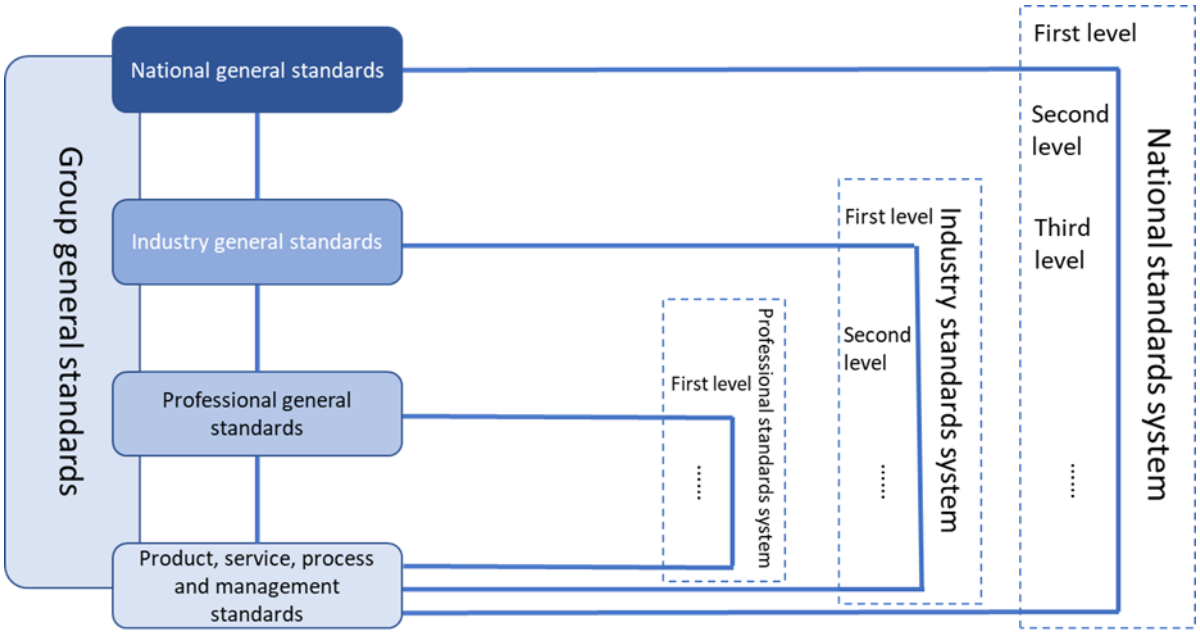


Figure 2-1 Relationship between the levels and classes in China's standards system[14]

Among them, the scope of the national standards system covers cross-industry comprehensive standards, industry general standards, professional general standards, product standards, service standards, process standards and management standards. The industry standards system is a standards system planned, built and maintained by the competent authorities of the industry, covering the general standards of the industry, the subdivision standards of the industry, as well as product standards, service standards, process standards and management standards. Meanwhile, group standards are standards issued by social groups according to the market mechanism, including national standards, industry standards, professional standards, as well as product standards, service standards, process standards or management standards[15].

[14] GB/T 13016-2018. (2018). Principles and requirements for standard system construction.

[15] Machinery Industry Standardisation and Quality. (2018). GB/T 13016-2018 Interpretation of the Construction Principles and Requirements for a Standards System. Machinery Industry Standardisation and Quality . 545(10), 29-34.

Standards at all levels usually require a long time to reach a consensus within a group before they can be developed. **The "climate investment and finance standards" discussed in the report are broadly defined standards, including guidelines and implementation methods for the industry to implement climate investment and financing products or services, and provide support for the development of group, industry, national or international standards through industry practices.**

2.2 Climate Investment and Finance Standards in China

Currently, there is no unified definition of climate investment and finance in the world. Most studies focus on "climate finance". The Chinese government has put forward the concept of climate investment and finance based on the advice of a large number of experts. As a new concept, climate investment and finance combines climate finance and climate investment, including financing services and products of financial institutions, as well as climate-friendly investment and risk management of government departments and enterprises.

The World Bank considers climate finance[16] to include all resources to promote low-carbon and climate-resilient development, support an enabling environment for adaptation and mitigation by covering the costs and risks of climate action, and encourage research, development and deployment of new technologies. According to the Climate Policy Initiative (CPI) [17], climate finance includes "1) financial support for adaptation and mitigation activities[18]; 2) capital flows from developed to developing countries (north to south); 3) capital flows from developing countries to developing countries (south-south); 4) domestic climate capital flows in developed and developed countries (north to north); 5) domestic climate finance flows in

[16] The World Bank. (2011). Mobilizing Climate Finance: A Paper prepared at the request of G20 Finance. The World Bank. Available at: https://www.imf.org/external/np/g20/pdf/110411c.pdf.

[17] Buchner B, Falconer A, Herve-Mignucci M, et al. (2011). The Landscape of Climate Finance. Climate Policy Initiative.

[18] Including capacity building and R&D, and the transmission to promote the development of low carbon and climate defence.

developed and developing countries respectively; 6) flows of public, private and public-private funds; 7) incremental costs and investment capital; 8) the level of international investment and the total and net flows of countries' net contributions."

Chinese scholars have also studied the definition of climate finance. Chen Xinping[19] defined climate finance as a series of financing activities and related institutional arrangements implemented by the international community to cope with global climate change. Wang Yao[20] interprets that climate finance should be defined in the paradigm of climate economics: it refers to using multi-channel financial sources and diversified and innovative financial instruments to promote global low-carbon development and enhance the resilience of human society to cope with climate change. Thus, it is innovative finance related to climate change.

Referring to China's national conditions and development plan, "climate investment and finance" discussed in this project mainly refers to **the investment and financing activities that aim to guide and promote more capital to cope with climate change mitigation and adaptation, to help achieve China's series of national medium- and long-term low carbon development goals and NDCs, including peaking of CO_2 emissions around 2030 and making best efforts to peak early.** It is a generic term for the financial and investment business involved in tackling climate change, using multi-channel funding sources and a variety of innovative financial tools to promote global low carbon development and enhance the resilience of human society in coping with climate change.

The field of climate investment and finance includes two categories: mitigation and adaptation (see **Figure 2-2**). The mitigation approaches mainly include end-use fuel and power efficiency, renewable energy, CCUS, end-use fuel switching, nuclear energy, power generation efficiency and fuel switching. Adaptation approaches include more efficient use of scarce water

[19] Chen X. (2011). Climate Finance (气候金融). Shanghai: Lixin Accounting Press.

[20] Wang Y. (2013). Climate Finance (气候金融). Beijing: China Economy Press

resources, use of building standards that can withstand extreme weather conditions, construction and improvement of flood control projects, development of crops that can adapt to drought conditions, selection of forest species and management models that can withstand storms and fires, and establishment of land corridors to assist species migration.

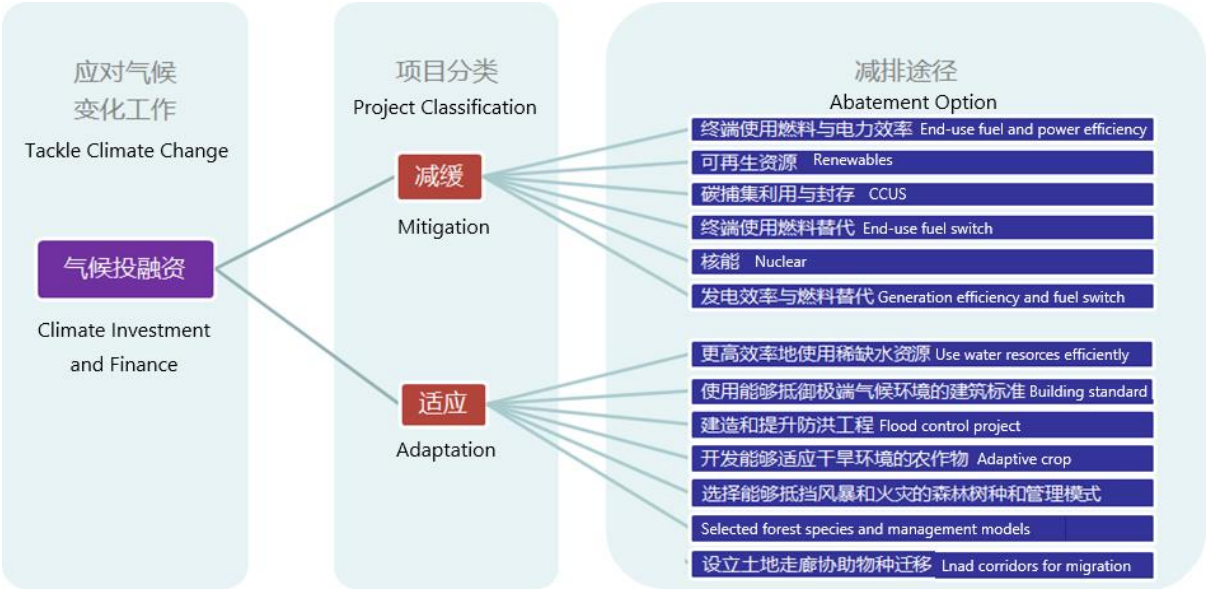


Figure 2-2 Climate investment and finance project classification and technical path

China's climate investment and finance work is still in its initial stage, and there is no standards system or sub-standard for climate investment and finance. According to the research of the National Center for Climate Change Strategy and International Cooperation, the potential of the current climate investment and finance in China's capital market has not yet been utilised. The current limitations include the shortage of the supply of funds, term mismatch of climate finance products, high costs in climate investment and financing, lack of asset pricing method for carbon market-related products. Developing climate credit, climate bond, climate fund, climate insurance, financial tools and services related standards or pilots are potentially effective ways to solve the current constraints. Develop a climate risk approach may avoid the potential risks of climate change on the investment and financing field[21]. The International

[21] Chai Q, Fu S, Wen X, et al. (2019). The development status and policy suggestions of climate investment and finance in China (中国气候投融资发展现状与政策建议). Chinese Environment, 4.

Institute of Green Finance of the Central University of Finance and Economics suggests[22] that we should learn from the experience of international climate investment and finance projects and establish a diversified climate investment and finance mechanism by using a variety of financing tools. We should also emphasise investment in adaptation projects to promote climate-resilient infrastructure. However, currently, all relevant national and international institutions adopt their internal climate standards, and there is no set of unified climate finance standards.

To guide and promote more funds flowing into climate change mitigation and adaptation, we will build a new investment and financing system that is "more focused on green, low-carbon development and more climate-friendly". The Department of Climate Change (DCC) of the MEE, has carried out a series of climate change financing innovations (from now on referred to as climate investment and finance) jointly with the relevant functional departments to address climate change. Since 2018, the MEE, which is in charge of China's efforts to address climate change, has accelerated the development of climate investment and finance by focusing on the role of the market in optimising the allocation of resources to implement the goals of addressing climate change and low-carbon development. In 2019, the People's Bank of China was included as a member of the leading national group on climate change, energy conservation and emission reduction, creating favourable conditions for the financial system and financial policies to deliver a systematic response to China's response to climate change. At the same time, the MEE, together with the People's Bank of China, China Banking and Insurance Regulatory Commission (CBIRC), the National Development and Reform Commission (NDRC) and the Ministry of Finance (MOF), promoted the establishment of a special

[22] Cui Y & Qian Q. (2019). Case study of green climate fund investment: The South African Development Bank climate finance loan scheme (绿色气候基金投资案例分析：南非开发银行气候融资贷款计划). The International Institute of Green Finance of the Central University of Finance and Economics.

committee on climate investment and finance to better coordinate policies on climate change with financial investment policies.

2.3 Green Finance Standards

Since 2015, China has actively carried out extensive research and practice on the construction of a green finance system, which has received considerable attention from the government. In March 2015, China launched the "Green Finance Reform and Green Transformation Promotion" major research project[23], devoted to setting up a related system to ensure the integrity of the investment project environment system, and guide capital flowing into green projects. Promotion of "green" has been regarded as a new growth opportunity for financial development, establishing the policy of China's green finance system framework and roadmap. In August 2016, seven departments, including PBOC, CBIRCMEE, MOF and the NDRC, jointly issued the Guidance on Constructing a Green Finance System[24], which covers 35 contents in nine aspects and clearly defines the concept and scope of green finance. In September 2016 and at the end of the same year, the Central Committee of the Communist Party of China, the State Council, the People's Bank of China and other departments put forward the means and policy framework for developing green finance, promoting green transformation, stimulating green development and building a green finance system[25]. Since then, superior design of green development has been established, and the green finance system has taken initial shape. The 13th Five-Year Plan released at the end of 2016, and the 13th Five-Year Comprehensive Work Plan for Energy Conservation and Emission Reduction issued by

[23] Shi S. (2015). China's first official green finance research project has been officially launched (我国首个官方绿色金融研究课题正式启动). Tehcnology Daily. Available at: http://scitech.people.com.cn/n/2015/0213/c1057-26558331.html

[24] PBOC, MOF, NDRC, et al. (2016). Guidance on building a green financial system (关于构建绿色金融体系的指导意见). Available at: http://www.mee.gov.cn/gkml/hbb/gwy/201611/t20161124_368163.htm

[25] Pan X. (2017). Green finance in China: practical dilemma and countermeasures (绿色金融在中国:现实困境及应对之策). Contemporary Economy & Management. 39(3):86-89

the State Council in January 2017, clearly emphasised the importance of developing green finance and constructing the system, promoting the innovation of green financial services and making it a major strategic decision of the country, and put forward the urgency of accelerating the design of the green finance system.

Along with the development of green finance, the corresponding green finance standard also comes into being. China has set up a series of standards related to green finance, including those related to green credit and green bonds released by PBOC, CBIRC and CSRC. Jointly, with the National Association of Financial Market Institutional Investor (NAFMII), they also released related standards of green bond information disclosure. The MEE and other relevant government departments have released the green rating standard for enterprises. China Lianhe Equator Environmental Impact Assessment Co. Ltd. created enterprises credit rating standards and Golden Credit Service and China Chengxin Credit Rating Group also released green bond rating standards. The above green finance standards have formed a preliminary green finance standards system in China (**Table 2-1**).

As one of the critical projects of the financial industry standard system[26], the project of green finance standardisation is also being accelerated. In 2017, the Plan for the Construction and Development of the Standardisation System of the Financial Industry (2016-2020) put forward the main tasks for the standardisation work of the financial industry during the 13th Five-Year Plan period, centring on the standard system, standard system revision, implementation, publicity and implementation, and international standardisation, and listed the green finance standardisation project as one of the five key projects.

[26] PBOC, CBRC, CSRC, et al. (2017). The construction and development plan of the standardisation system of the financial industry (2016-2020) (金融业标准化体系建设发展规划（2016-2020 年）（银发[2017]115 号）).

Table 2-1 Proposed China's green finance standards

Standard category		Standards	Released by
Standard for green financial products	Green credit standards	Green Credit Guidelines，Green Credit Statistic System, Key Evaluation Indicator of Green Credit Implementation, Energy Efficiency Credit Guidelines	CBRC (now CBIRC)
		Green Credit Special Statistical System	PBOC
	Green bond standards	Green Bond Supporting Project Catalogue	GFC
		Notice on Issuance of Green Financial Bonds in the Inter-Bank Bond Market	PBOC
		Guidelines on Green Bond Issuance	NDRC
		Notice on the Pilot Project of Green Corporate Bond	Shanghai Stock Exchange (SSE)
		Notice on the Pilot Project of Green Corporate Bond Business	Shenzhen Stock Exchange (SZSE)
		Guidance on Supporting the Development of Green Bond	CSRC
		Guidelines on Green Bond Financing Instruments for Non-financial Enterprises	NAFMII
	Others	Directory of Green Industry Guidance	NDRC
Green financial information disclosure standards		Notice on Issuance of Green Financial bonds in the Inter-bank Bond Market	PBOC
		Disclosure of Information on the Duration of Green Financial Bond	PBOC
		Guidelines on the Assessment and Certification of Green bond (Interim)	PBOC, CSRC
		Green Credit Guidelines	CBRC (now CBIRC)
		Guidelines on Supporting the Development of Green Bond	CSRC
		Notice on the Pilot Project of Green Corporate Bond	SSE
		Notice on Pilot Projects of Green Corporate Bond Business	SZSE
		Guidelines on Green Bond Financing Instruments for Non-financial Enterprises	NAFMII
Green certification rating standards	Corporate principal green rating	Measures for Enterprise Environmental Credit Evaluation (Trial)	Ministry of Environmental Protection (now MEE), NDRC, PBOC, CBRC (now CBIRC)
		Guiding Opinions on Strengthening the Construction of Enterprise Environmental Credit System	Ministry of Environmental Protection (now MEE), NDRC
		Corporate Principal Green Rating Method System	China Lianhe Equator Environmental Impact Assessment Co. Ltd.
	Green bond certification and rating	Natural Environment Credit Analysis Framework and Green Bond Credit Rating Method	Golden Credit Service
		China Chenxin International Green Bond Assessment Method	China Chengxin Credit Rating Group

In 2018, with further refinement of the green financial standards system, the research institution of the PBOC proposed the "green financial standard system framework"[27]. It divided China's green financial standardised key projects into six categories including **common base, product service, credit rating and verification, information disclosure, statistics and sharing, risk management and safeguard** and 35 sub-standards. In September of the same year, the first plenary meeting of the working group on green financial standards of the national financial standardisation technical committee was held in Beijing, with the Regulation of Green Finance Standard Working Group approved and the Research Task and Division of Works on the Green Finance Standard System (discussion paper) adopted.

According to the Regulation of Green Finance Standard Working Group, the framework of the green finance standards system mainly includes the following six categories and 35 sub-standards:

Work on common basic standards for green finance, including standardisation guidelines, green finance terminology standards, environmental data standards, standard terminology codes and green industry project directory.

Green financial products and services standards, including green credit product standard, green bond standard, green insurance product standard, green trust products standard, carbon finance and derivatives product standard, green leasing product standard, environmental equity financing tools standard, and other financial products green standard, and green underwriting standards.

Green credit rating and certification standards, including environmental credit rating standards, environmental benefit certification standards, environmental benefit

[27] PBOC Research Bureau. (2018). Conferenct on Research on the green finance standards system (Annex 1) (关于开展绿色金融标准体系研究的会议通知（附件 1）).

certification standards for green projects, and evaluation standards for green financial institutions.

Green financial information disclosure standards, including environmental information disclosure standards for listed companies, environmental information and benefit disclosure standards for financial institutions, environmental benefit disclosure standards for key projects, environmental risk management system disclosure standards for financial institutions, and information disclosure standards for major environmental events.

Green finance statistics and sharing standards, including statistical classification code standards, green finance statistical information sharing platform, green finance service statistical standards, green finance environmental benefit statistical standards, information release elements and formats, financial institution assets environmental risk statistical standards and environmental information statistical standards.

Green finance risk management and assurance, including compliance standards for green financial products and services, environmental stress tests of financial institutions, environmental risk monitoring standards, risk disposal standards for key environmental events, and anti-greenwashing audit standards.

The construction of the green finance system is a systematic project, which cannot be separated from the active role of the government, the innovative practice of financial institutions and the active participation of enterprises. However, some bottleneck problems[28, 29, 30, 31] in the aspect of government regulation, financial institutions and corporate practice of

[28] Pan X. (2018). Construction of green financial system in China: practical problems and coping mechanism (我国绿色金融体系建设:现实问题及应对机制. 金融教育研究). Financial Education Research. 31(1), 32-37

[29] Wu J. (2018). Study on the current situation, problems, and countermeasures of China's green financial system construction (我国绿色金融体系建设的现状、问题及对策研究. 绿色科技). Green Technology. 14:272-280.

[30] Cai Y & Zhang Y. (2014). Construction of green financial system: problems and solutions (绿色金融体系的构建：问题及解决途径.). Financial Theory and Practice. 9:66-70

[31] Pan X. (2017). Green finance in China: practical difficulties and countermeasures (绿色金融在中国：现实困境及应对之策). Contemporary Economic Management. 39(3):86-89.

green development in China's green financial practice still exist and need to be addressed. These include: 1) lack of systematic, overall superior design and overall planning; 2) lack of a sound legal system and strong regulatory means, such as the limited scope of government regulation and bank regulation, and lack of pertinence in some areas; 3) imperfect green financial service system and imperfect innovation system; misallocation of financial resources leads to difficulty in financing green projects; commercial banks and other financial institutions have limited ability in technology identification and risk assessment; 4) enterprises have the poor subjective initiative in participating in green finance and relatively low participation in green development practices; 5) failure to conform to international green finance standards will affect international cooperation to a certain extent, as it could lead to failure in attracting international capital to participate in Chinese green projects.

In light of the above problems, the existing green finance research suggests that at the level of government regulation, a complete legal support system and the guidance standard of specific implementation rules[32] [33] are needed. In addition, more useful information sharing mechanisms need to be established, and we also need to improve the overall quality of green financial assets, not just the quantity[34,35]. Coordinated support of government policies is needed to internalise the externalities of green finance. At the financial institution level, clear guidelines and implementation rules are required and there is also a need for financial institutions to proactively deploy to create an endogenous drive for green finance and products

[32] Pan X. (2018). Construction of green financial system in China: practical problems and coping mechanism (我国绿色金融体系建设：现实问题及应对机制). Financial Education Research. 31(1), 32-37

[33] Wang G. (2015). Chapter 5: Problems and Difficulties in the Development of China's Green Finance.In: Greening China's Financial System. DRC, IISD. Available at: https://www.iisd.org/sites/default/files/publications/greening-chinas-financial-system-chapter-5.pdf

[34] Gilbert S & Zhou L. (2017). Working Paper: The Knowns and Unknowns of China's Green Finance. The New Climate Economy. Available at: http://www.indiaenvironmentportal.org.in/files/file/ChinaGreenFinance.pdf

[35] Jiang B, Guo J, Gordon-Jones R. (2018). Financial Services Special Report: China's Green Finance Market. British Embassy Beijing. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/738876/China_Financial_Services_Special_Report_-_Green_Finance.pdf

and services. At the enterprise level, the additivity of green benefits should be revealed. And last but not least, the concept of green development needs to be deepened.

2.4 Relevant international standards

There is no established global standard for climate investment and finance. The TC207 working group of ISO/DIS 14097 is working on a framework[36] for assessing and reporting on climate change-related investment and financing activities. The objectives of the ISO14097 standard include three aspects: the impact of investment decisions on greenhouse gas (GHG) emissions and climate resilience trends in the real economy; how investment and financing decisions match the low-carbon transition path and the climate goals of the Paris Agreement; and the impact of transition risks of climate change on the value of financial assets. The working team on the establishment of the standard reviewed the standards system related to global climate investment and financing, most of which are the asset identification standard of green finance.

It is worth learning from the existing green finance standards when coming to construct relevant standards of climate investment and finance. The green finance standards system generally refers to a series of classification methods and measurement indexes that are established to identify, confirm and track green assets and green investment with the orientation of international, regional or national green development strategic goals. A variety of international and national green credit, green bond, green stock index, green development fund, green insurance and other related financial products and services have been widely established

[36] ISO/DIS 14097. (Under development). Framework including principles and requirements for assessing and reporting investments and financing activities related to climate change. Available at: https://www.iso.org/standard/72433.html

or adopted various green finance standard systems with different connotations and extensions. In general, the green finance standards system includes the following six elements[37]:

（1）Sectoral Taxonomy/Classification;

（2）Identification and Standards;

（3）Proceeds Requirements;

（4）Incentives;

（5）Verification and Labelling; and

（6）Post Investment Monitoring

Currently, there are three major types of green finance standards systems, that are generally recognised. The first type is a series of voluntary principles issued by financial institutions or organisations, including the Green Bond Principles (GBP) [38], the Equator Principles (EPs) [39] and the Climate Bonds Standard (CBS)[40], the World Bank's Green Bond Process Implementation Guidelines[41] and the Asian Development Bank's (ADB) Green Bond Framework[42]. The second type is the assessment system introduced by financial services institutions, mainly developed by assessment and rating agencies, such as Moody's Green Bond Assessment system[43] and Standard & Poor's Green Evaluation system[44]. The third is issued by the regional or national competent departments, including the European Union (EU) Green

[37] Jia F, He J, Yang J, et al. (2019). 2019 Climate Investment and Finance Case Study (2019 气候投融资典型案例研究报告). Beijing: Publicity and Education Center of the MEE.

[38] ICMA. (2018). Green Bond Principles: Voluntary Process Guidelines for Issuing Green Bonds. ICMA. Available at: https://www.icmagroup.org/green-social-and-sustainability-bonds/green-bond-principles-gbp/.

[39] Equator Principles. (2020). The Equator Principles (EP4): A Financial Industry Benchmark for Determining, Assessing and managing environmental and social risk in projects. Equator Principles. Available at: https://equator-principles.com/wp-content/uploads/2020/01/The-Equator-Principles-July-2020.pdf.

[40] Climate Bonds Initiative. (2019). Climate Bonds Standard Version 3.0. CBI. Available at: https://www.climatebonds.net/files/files/climate-bonds-standard-v3-20191210.pdf.

[41] The World Bank. Green Bond Process Implementation Guidelines. The World Bank. Available at: http://pubdocs.worldbank.org/en/217301525116707964/Green-Bond-Implementation-Guidelines.pdf.

[42] ADB. Green Bond Framework. ADB. Available at: https://www.adb.org/sites/default/files/adb-green-bonds-framework.pdf.

[43] Moody's Investors Service. (2016). Green Bond Assessment (GBA). Moody's. Available at: https://www.amwa.net/sites/default/files/GBA%20Methodology-final-30march2016.pdf.

[44] S&P Global Ratings. (2018). Green Evaluation: time to turn over a new leaf?. S&P Global Ratings. Available at: https://www.spratings.com/documents/20184/1481001/Green+Evaluation/bbcd37ba-7b4f-4bf9-a980-d04aceeffa6b

Bond Standard[45] that the EU is pushing for, China's Green Credit Guidelines[46], Green Bonds Issue Guidelines[47], Green Bonds Supporting Project Directory (2015 Edition)[48], Green Industry Guidance Catalogue (2019 Edition)[49].

The **industry category** assessment of green finance standards is the first step in identifying green financial assets and industry categories, including primary and secondary catalogues. The green finance standard catalogue has a high degree of convergence, covering areas such as renewables, energy efficiency, pollution prevention and control, water management, clean and low carbon transportation, and green and low carbon buildings. There are two significant differences in the industry classification of green finance - China's green finance standards generally do not include climate change adaptation. In contrast, international green finance standards include climate mitigation and adaptation-related fields. Whether coal, nuclear power and rail transit should be included in the green finance category is still controversial. International green standards generally explicitly exclude fossil fuels except for the use of CCUS technology. The Green Credit Guidelines issued by the China Banking Regulatory Commission (now the CBIRC) in 2012 also did not cover the coal sector. However, the Green Industry Guidance Catalogue released by NDRC in 2019 still includes clean coal use. Compared to the simple filtering criteria according to the fields in the international standard, some of China's green finance standards are more targeted for technology application. For instance, the Green Industry Guidance Catalogue of the NDRC sets scale or the technical threshold for the industry green finance project. These are, for example, minimum capacity for coal-fired thermal power units; the industry standard for energy-saving technological

[45] EU Technical Expert Group on Sustainable Finance. (2019). Report on EU Green Bond Standard. EU. Available at: https://ec.europa.eu/info/publications/sustainable-finance-teg-green-bond-standard_en.

[46] CBRC (now CBIRC). (2012). CBRC's notice on the issuance of green credit guidelines (CBRC (2012) No.4).

[47] NDRC. (2015). Notice on the issuance of guidelines on the issuance of green bonds (NDRC (2015) No. 3504) .

[48] GFC, China Society for Finance and Banking. (2015). Directory of green bond supporting projects (2015 Edition) .

[49] NDRC. (2019). A notice on the issuance of the green industry guidance catalogue (2019 edition) (NDRC (2019) No.293) .

transformation projects; and clear, quantified indicators of the photoelectric conversion efficiency and the attenuation rate of polysilicon components (monocrystalline silicon components, high concentrated photovoltaic modules, membrane cells components) of photovoltaic power generation projects. Setting up the threshold in industry complicates the certification process, but avoids industries' outdated capacity being identified as green assets.

There are different ways to **identify green assets**, including sector identification, sector plus threshold identification, negative list/exclusion identification and a scoring system. Among them, the scoring system can be further extended into two types of qualitative evaluation system (according to expert opinions) and quantitative evaluation system (according to quantitative data). The GBP, CBS and EU's forthcoming classification scheme are identified by sector. For example, under these three principles, all wind power assets are simply classified as green assets. The operation cost of sector identification is low, but it is difficult to exclude the critical influencing factors beyond the green attribute, such as social influence and backward production capacity. The NDRC's Green Industry Guidance Catalogue adopts thresholds of technology and scale, which are conducive to eliminating outdated production capacity and projects that are not encouraged by the government to invest in. Moody's and Standard & Poor's, the world's leading credit rating agencies, use a scoring system that includes disclosure and other factors, in addition to green attributes.

Capital requirements include requirements for the use and management of green capital raised, referred to as capital requirements, including the field or project invested in, the time of investment, reinvestment requirements, and whether it can be used to repay corporate debt and other factors. CBS requires companies to invest in green assets within two years with raised capital. Currently, most green finance standards require that all, or a certain percentage, of green funds raised be invested in green assets allowed by the standards. For corporate green

bonds issued under the NDRC's Green Industry Guidance Catalogue, raised capital can be used to repay the existing liabilities of the enterprise. If the enterprise involves both green and non-green assets, it is difficult to supervise the use of funds. Reinvestment of the capital obtained by enterprises through green finance is often not restricted by the green finance standards.

The essential factor that distinguishes green finance from traditional finance is **incentive policy**, which directly affects the rate of return of green financial products and non-green financial products. Incentive policies include pre-issuance incentives, in-issuance incentives and post-issuance incentives, including public sector interest discounts and tax relief policies, low-interest loans from policy-based financial institutions, and grants from multilateral institutions. The implementation of incentive policies is conducive to encouraging enterprises to increase investment in green assets. However, due to the large scale of assets involved in green finance, the cost of screening and auditing needs to be urgently reduced, and the difficulty of fiscal subsidies (such as interest discount on green bonds) is significant. At present, the support policies of governments for green finance have not had a substantial impact on the income of green financial products worldwide. However, Singapore has adopted a policy of subsidising the assessment fees for green bond issues.

The 2019 EU Green Bond Standard encourages member states and financial institutions to link the standard directly with the future standards of the financial industry. Central banks will step up their participation to enhance the market's acceptance and recognition of green finance. At the same time, it is suggested that all member states implement preferential tax policies, including adopting "accelerated depreciation method[50]" for green assets and investment and improve the competitiveness of green assets. In China, the city of Huzhou in

[50] IRS. (2019). How to Depreciate Property (Publication 946). Available at: https://www.irs.gov/publications/p946

Zhejiang Province has taken the lead in formulating local standards for green finance[51]. It is building a green finance reform and innovation pilot zone, promoting financial institutions to carry out green rating, labelling and information disclosure, as well as promoting the greening of the construction industry and the marketisation of environmental rights and interests, thereby comprehensively supporting the development of green finance[52]. It is noteworthy that the ability to generate additional green benefits should be the basis for policy support from governments and multilateral institutions. If a green investment and financing project is successfully carried out without being labelled as green (i.e. without additionality), the preferential policies provided by the government and multilateral institutions are likely to lead to the waste of resources and squeeze the commercial investment and financing. It is a great pity that many green finance standard-setting organisations are aware of this problem (e.g. section 2.1 of the EU Green Bond[53]), but do not encourage green bond issuers to disclose the additionality, which may mislead climate-friendly investors and policymakers.

Also, to reduce investment and financing costs, Ma Jun, Director of Green Finance Committee (GFC), China Society for Finance & Banking, and other experts suggest reducing the risk weight of green assets held by the bank (including green credit and green bonds)[54], thereby significantly reducing the financing costs of green credit and bonds, which also incentivises banks to increase the green credit issuance. According to relevant studies, if the risk weight of green credit in China is reduced from 100% to 50%, the financing cost of green projects nationwide may be decreased by 4% to 5% on average. Currently, preliminary studies

[51] China Financial News. (2018). Huzhou released the first national green finance local standards (湖州发布全国首批绿色金融地方标准). Tonghuashun Finance. Available at: http://field.10jqka.com.cn/20180904/c606935597.shtml

[52] Jiang N. (2019). Huzhou, Zhejiang Province, has embarked on a new journey of green finance reform and innovation pilot zone construction (浙江省湖州市全面开启绿色金融改革创新试验区建设新征程). China Financial Information Network. Available at: http://greenfinance.xinhua08.com/a/20190308/1802593.shtml

[53] EU Technical Expert Group on Sustainable Finance. (2019). Report on EU Green Bond Standard. EU. Available at: https://ec.europa.eu/info/publications/sustainable-finance-teg-green-bond-standard_en

[54] Ma J. (2018). Ma Jun: Reduce the risk weighting of green assets. China Finance (马骏：降低绿色资产风险权重). Available at: https://www.sohu.com/a/270746627_481887

from various national and international sectors indicate that, if it can be proved that the default rate of green assets is lower than that of non-green assets, which is conducive to the overall stability of the financial system, it is reasonable to consider reducing the risk weight of green assets and increasing the risk weight of brown (polluting) assets. If the default rates differ significantly, commercial institutions are theoretically well-positioned to reflect the benefits of a lower default rate based on the financing costs of green assets.

The **certification** of green financial products mainly refers to the evaluation and verification of the issuer's internal processes, including screening of projects and assets, tracking them and internal processes and spending of raised capital. The verification bodies adopt procedures to assess the readiness of the issuer and the compliance of the proposed bonds with the standards, and employ general procedures (or lists) to assess the compliance of the proposed bonds with the pre-issuance requirements of the climate bond standard. Specifically, it includes the following steps: confirmation of green asset investment, certification application, Second Opinion or Third-Party Review (if any), green asset labelling, and green asset issuance, as shown in **Figure 2-3**.

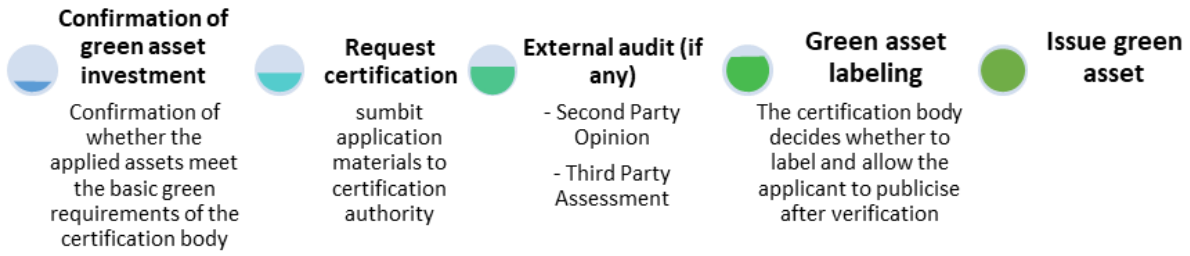


Figure 2-3 The flow chart of the certification process of green financial products

Confirmation of green asset investment refers to the preliminary review of whether the green financing application submitted (green credit, bonds, etc.) meets the definition and necessary requirements of "green" for financial institutions. For the identified projects, the applicant shall formally submit the certification application to the financial institution,

including the project application and issuance qualification, capital use, monitoring and reporting methods. During this period, the financial institution may require the applicant to submit a Second Opinion or a Third-Party Review. The largest second-party opinion service on green bonds is an assessment[55] conducted by the Centre for International Climate and Environmental Research at the University of Oslo in Norway (CICERO), which innovatively further subdivided the labelled green bonds into the dark, medium and light greens[56].

The Second Opinion is mainly general summaries of projects and carried out in the form of consultation; therefore, it is likely to lack credibility. Third-Party Review refers to the comprehensive assessment of the industry standard, capital use, capital management and monitoring and reporting of the product by independent institutions hired by the issuer, according to the recognised green financial standards system. Irrespective of it being the second party's opinion or the third party's verification, the existing market model is evaluated by the organisation hired by the issuer, and consequently, there will be potential conflicts of interest that are difficult to resolve.

The financial institution decides whether to label and issue the green asset after considering all the application materials. In practice[57], the primary international assessment and certification standards are GBP and CBS, with China mainly adopting the Green Bond Supporting Project Catalogue released by the GFC.

Post-issuance monitoring is an essential but complicated part of the application of green finance standards. It is mainly due to the additional costs, and strict monitoring system involved. It will restrict the investment opportunities of financing institutions, which may reduce the enthusiasm of enterprises to issue green financial products. Post-issuance monitoring and

[55] CICERO. (2020). Shades of Geen. Available at: https://www.cicero.green/our-approach

[56] Dark green: implement solutions with long-term green benefits; medium green: a solution between long-term and short-term green benefits; light green: short-term green benefits, not a long-term solution

[57] Fu Y, Wu Y, Shi Y. (2019). 2018 Practice analysis of China's green bond appraisal and certify-cation (2018 中国绿色债券评估认证实践分析). IIGF. Available at: http://www.tanjiaoyi.com/article-28329-1.html

tracking includes reporting the use of funds and proceeds, regularly disclosing the environmental and social impacts of the project, and post-release verification and assessment by third-party agencies. CBS strictly sets out the specific requirements and revocation of green bond issuance certification. The EP4 requires that direct GHS emissions (Scope 1) and indirect GHGs from thermal or thermal use (Scope 2) must be publicly disclosed annually for projects with annual total CO_2 emissions of more than 100,000 metric tonnes. The above standards issued by mainstream international organisations, institutions and governments are highly authoritative and influential. They provide a practical basis for developing green and climate financial products in the world. However, there are some differences in details, which reflect different backgrounds and development demands.

Firstly, the definition of "green" is different. The definition of green varies from country to country due to the differences in stage, key concerns and the operating institution of socio-economic development. The EU and institutions such as the CBI, the World Bank and the ADB have gradually focused on climate change mitigation and adaptation in recent years. On this basis, the Green Bond Principle also pays much attention to biodiversity conservation and other fields. China's green finance standards focus more on energy conservation, clean energy, pollution control, green infrastructure, clean transportation and ecological protection. A more noticeable difference is the attitude of all parties to the utilisation and upgrading of coal fossil energy. For example, the update of old coal plants is generally judged as a "brown project" by international standards, which is not supported because it will extend the coal mining time. However, China's national green finance standards include the clean use of coal and do not require the use of CCUS to reduce carbon emissions from coal use.

Secondly, the scope and degree of refinement of the standards are different. From the perspective of the range, the CBS, the GBP, the rating agency systems and the current green

standards in China fail to include social benefits in the scope of screening and monitoring. The EP4, the World Bank and the ADB cover environmental, social and governance (ESG) indicators in their standards. The directory level and technical details of standards vary significantly. Both the Climate Bond Standard (CBS) and China's Green Industry Guidance Catalogue subdivide the industry into three categories and specify the threshold of the industry technology. GBP and the World Bank set the first-class directory, and the standard is relatively broad, and with a lack of operability. The EP4 are mostly descriptive in principle and impose conceptual requirements on environmental risks. Other criteria should refer to the ADB's basic theoretical specifications. China's Green Bond Supporting Project Catalogue (2015 Edition) and the Green Industry Guidance Catalogue (2019 Edition) both stipulate specific projects and quantitative standards for loan use, and separately explain the standards, which are of great guiding significance for the selection and evaluation of actual projects.

Thirdly, nature and implementation effectiveness are different. International standards are mostly voluntary in adoption and compliance, not mandatory. The green project or financial institution can obtain the labelling or certification after the voluntary application and verification by the standard-setting institution or a third party. Moreover, the reporting and disclosure requirements are relatively loose after the issuance, and the role of government is unclear. China's green finance standards are issued by the government regulatory departments, which have executive force for the involved industries and participants. Besides, relevant departments are also responsible for examining, approving and supervising green investment and financing activities, thereby tangibly standardising and promoting the orderly development of green investment and finance.

We note that with the increase of cross-border finance and international environmental cooperation, global green finance standards are gradually converging. Meanwhile, as the global

awareness of environment and climate change issues deepen, more and more governments and organisations realise that the current traditional green finance system is difficult or unable to effectively support the strong financial and institutional needs for countries to achieve their NDCs in the Paris Agreement and the UN 2030 Sustainable Development Goals (SDGs). In the discussion and practice of green finance, due to the particularity of its nature, purpose and methodology, the concept and development demand of "climate investment and finance" have become increasingly prominent, and climate effect is often the most crucial consideration of the international green finance system.

2.5 Reference and inspiration

2.5.1 Clarify the relationship between the climate investment and finance standards system and the green finance standards system

The concept and scope of green finance indicate that green finance includes tackling climate change, and that climate investment and finance are inseparable from green finance. The development of green finance in China has laid a foundation for promoting the work of climate investment and finance, and the construction of the green finance standards system also provides reference, experience and an entry point for the development of the climate investment and finance standards system. Based on the close relationship between climate investment and finance and green finance, several elements are needed to establish a system of climate investment and finance standards. These include formulating climate-related standards; dealing with the relationship with other green finance standards; and meeting climate policy and market demands in setting climate investment and finance standards.

Climate investment and finance is an essential part of green finance, with the financial activities involved focused on climate change mitigation and adaptation.

However, climate investment and finance are not subordinate to green finance. Both climate investment and finance could be a part of broad sense green finance (**see Figure 2-4**). Currently, some of the critical areas for addressing climate change may not be supported by climate finance, not by green finance should be included later on. Climate finance complements the lack of climate benefit information assessment and disclosure in green finance. On the other hand, green finance projects are financed through financial markets, excluding public sector and corporate investment, while climate investment and finance includes both investment and financing. Moreover, climate investment and finance does not include projects related to fossil energy supported by green finance, which is mutually exclusive to green finance. In addition to the clear distinction between climate investment and finance and green finance in terms of service objectives, tackling climate change has international, national and regional characteristics.

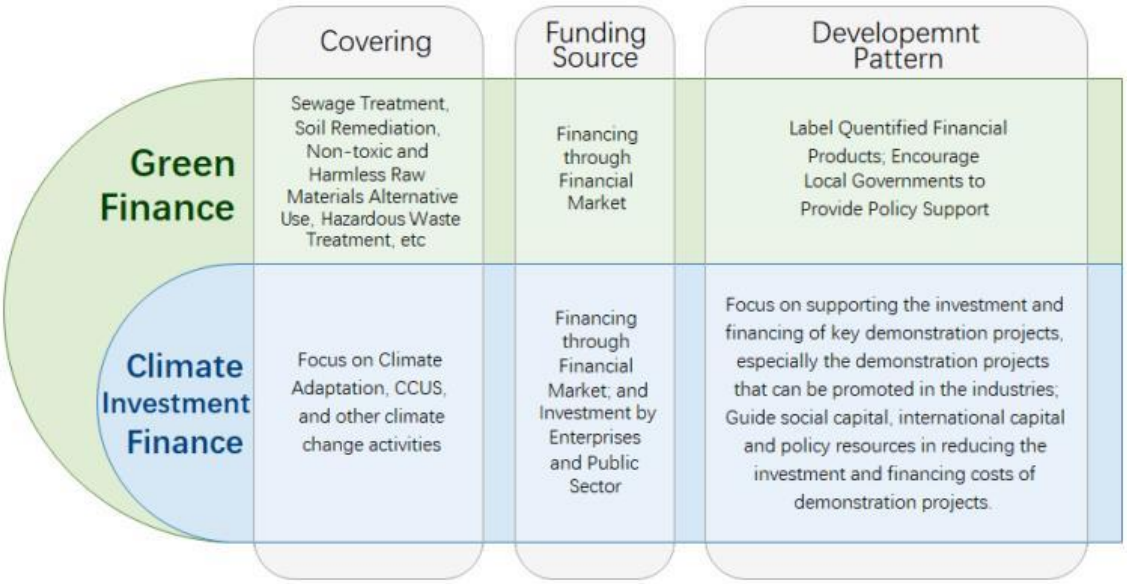


Figure 2-4 The relationship between climate finance and green finance

In addition to the statistics of climate attributed financial projects, climate investment and finance is focussed on supporting the investment and financing work of key climate investment

and financing projects - especially supporting industries with a demonstration project that can be promoted - and guiding social capital, international capital and political resources to reduce the cost of investment and financing of demonstration projects, gradually pushing the climate investment and finance work in a step by step approach climate investment and finance research involves policies, financial instruments and projects. Based on the close connection between climate investment and finance and green finance, it is suggested that relevant regulatory authorities build a climate investment and finance standards system by referring to relevant international standards and the construction experience of a domestic green finance standards system[58].

2.5.2 Suggestions on the eight principles for establishing a climate investment and finance standards system

The national and international evolution of green finance standards and the climate investment and financing activities lays a foundation for the construction of the climate investment and finance standards system. It is suggested that the following eight principles should be taken into consideration:

User-oriented: the establishment of a climate investment and finance standards system should first consider the target audience, such as multilateral institutions, governments or enterprises. The need for standards will vary from institution to institution. For example, purely climate-friendly investors may demand more stringent standards, while developing countries may find it harder to enforce overly-restrictive standards.

Clear objectives: medium- and long-term policy objectives for emission reduction and adaptation investment, such as the 2°C target of the Paris Agreement and NDCs, are essential

[58] Qian L, Lu Z, Fang Q. (2019). Six suggestions on climate investment and financing in China (对我国气候投融资的六大建议). People.cn. Available at: http://m.people.cn/n4/2019/0929/c141-13244850.html

reference factors for the construction of the climate investment and finance standards system. The standards design needs to promote industrial transformation and upgrading to serve the medium- and long-term policy objectives.

Apply unified core principles but contain distinct levels: the climate investment and finance standards system should establish unified principles, such as promoting investment in emission reduction and adaptation, reducing investment in high-emission fossil energy, and enhancing the ability of assets to adapt to the climate. However, for different types of customers, in different countries, the target of climate investment and finance standards service is different, and the details of the standards vary. For example, international climate-friendly investors may demand stringent standards that emphasise externalities, while financial institutions may only require standards related to climate statistics.

Coherent concept: climate investment and finance involves a wide range of industries and financial service institutions, and the key concepts need to be defined in a coherent way, such as low carbon, emission reduction, climate-friendly, climate adaptation, climate-friendly bonds, and climate funds. The coherency of concepts is beneficial in reducing the uncertainty of standard setters and users in the execution process.

Well defined rights and responsibilities: climate investment and finance standards involve standards-setting agencies, governments or certification agencies, enterprises, financial institutions, post-issuance review and monitoring, or third-party review agencies. The rights and responsibilities of all parties need to be taken into account to promote the construction of standards and encourage long-term development.

Consistent quantification: there is no uniform approach to emissions reduction and climate adaptation in the green financial system. As for how to calculate emissions reduction, there are many different calculation methods in academia and government. The calculation

methods of emissions reduction need to be clear, including direct emissions (Scope 1) and indirect emissions (Scopes 2 & 3), and it also involves the evolution of attributive life-cycle assessment and consequential life-cycle assessment methods. There is no uniform international model for the assessment and calculation methods of adaptive investment, which needs to be further studied.

Climate additionality: green and climate finance generally do not assess additionality, i.e. whether the project can be carried out without climate or green labelling. Due to the limited climate-friendly funding and related support policies, the standards system for climate financing needs to identify projects with a real need for concessional finance and climate incentive policies. The climate investment and finance standards system should have sub-standards to distinguish climate-friendly statistics or climate-friendly impact, with the later one has proved real additionality.

Commercially viable: climate investment and finance standards need to be commercially viable. If the assessment process is too complicated, the standard implementation costs would far exceed the benefits, and it will be challenging to operate sustainably. Indirect emissions statistics for assets, for example, are hard to achieve in the short-term if data are lacking.

Chapter III. What standards do we need for climate investment and finance?

3.1 User-oriented demands analysis

By discussing with stakeholders, we understand the needs of potential users of climate investment and finance standards. According to the types of institutions, this report divides the users of climate investment and finance standards into six categories:

- National policy departments
- National financial regulatory authorities
- Financial institutions (including domestic and international financial institutions, investors and issuers of financial products)
- Enterprises (including domestic and international enterprises)
- National and international climate-friendly investors
- Other international users

The research team also surveyed independent experts associated with the above users. From the perspective of various institutions, through policy analysis, literature review and preliminary research results, the following text outlines the proposed users' concerns on climate investment and finance standards, and we propose further consultation with users and stakeholders after the release of this report.

3.1.1 National policy departments

The primary policy department for climate change response is the Department of Climate Change of the MEE (hereinafter referred to as the "Department of Climate Change"). The Department of Climate Change (DCC) and relevant departments of ecology and environment in provinces, autonomous regions and municipalities in China, are responsible for climate change and GHG reduction works, including policy formulation and supervision. In addition

to the DCC, the relevant departments of the NDRC, the MOF, the Ministry of Science and Technology (MOST), the Ministry of Foreign Affairs (MOFA) and the Ministry of Emergency Management (MOEM), all have climate change policy functions.

According to the survey results, the primary demand of the DCC is - by establishing a climate investment and finance standards system - to guide climate finance to invest in climate-friendly projects efficiently, avoid high carbon emissions projects, and encourage enterprises and financial institutions to manage climate risks actively, thereby contributing to the achievement of NDCs. For other policy departments, climate investment and finance work are conducive to national medium- and long-term development goals, including improving research and technological capacity, driving industrial development and creating new drivers, and enhancing China's international image and climate voice. The climate division of the local departments of ecology and environment is interested in how climate investment and finance standards can help to peak emissions. This validity of the findings will need a further survey.

At the level of sub-standards (i.e. secondary standards) of the standards system, specific climate investment and finance standards are conducive to efficiently guiding public funds to invest in climate change work. According to the Research Center for Climate and Energy Finance, CUFE and the Energy Research Institute of NDRC[59], China still lacks an overall planning system for the allocation of climate change capital budgets. The domestic public budget only has a small number of special funds for climate change research projects, which cannot meet the country's needs to respond to climate change. Additionally, some stakeholders have concerns that climate change work-related fiscal funds are dispersed in different government departments, with different measurement and supervision regulations. In some cases, there are even repeated applications on some key projects. Therefore, it is suggested that

[59] Research Center for Climate and Energy Finance, CUFE, Energy Research Institute, NDRC. (2014). China's climate finance report 2013: innovation of public financing mechanism. Research Center for Climate and Energy Finance, CUFE.

a climate investment and finance standards system could promote better use of climate change capital from different departments, and carry out the public sector climate investment work more efficiently.

Some experts consider that rather than the unification of terminology and concepts in the field of green finance being carried out after the standards construction work, they suggest formulating a work plan for constructing a climate investment and finance standards system at government level as a joint base. The work plan should mainly include the development of climate investment and finance standards terminology, climate investment and finance classification and industry catalogue, and the coding of standards. It is also pointed out that a unified approach to assessing climate benefits is needed, including the benefits of mitigation and adaptation.

There are also experts who indicate to achieve national medium and long-term low carbon development tasks and China's NDCs; the current relevant technical standards system should be linked with the Green Industry Guidance Catalogue (2019 Edition), and formulate an NDCs projects guidance catalogue[60] to support climate project investment and finance. It is suggested that the directory be determined by climate change benefits. One international expert believes that if China establishes rigorous and forward-looking climate investment and finance standards, it will help the country obtain a greater voice in the field of climate change and enhance its international influence.

3.1.2 Financial regulatory authority

China's central financial regulators are the PBOC, the CBIRC, the CSRC and the Financial Affairs and Credit Department of the NDRC. The main functions of the PBOC (the Central Bank) are to coordinate monetary policy, plan the reform and development of the financial

[60] Appendix 2 of this report attempts to make a preliminary analysis and categorization of the climatic attributes of the industries involved in the Green Industry Guidance Catalogue.

sector, and guard against systemic financial risks. The Central Bank plays a coordinating role in the construction of a green finance standards system and leads the issuance of green financial bonds, and also actively exchanges green finance work with international banks. The primary function of the CBIRC is to supervise and regulate the business of financial institutions such as banks, trusts and insurance organisations, and it is the leading promoter of green credit policies. The main functions of the CSRC are to supervise the securities market and regulate the operation of commercial funds, including the issuance of green bonds by listed companies. The Financial Affairs and Credit Building of the NDRC is responsible for the management of some financial instruments, such as corporate bond issuance, private equity fund policy, industrial investment fund policy and social credit system construction.

Respondents from regulator departments think it necessary to establish a Monitoring, Reporting and Verification (MRV) system for climate investment and finance. They reflect the national climate change goals and indicators in the index system of financial regulation, for instance, by adding climate-friendly credit into the green credit or adding climate risk within the systemic risk management of financial institutions. Green finance experts claim that a market-based regulation approach requires governments to promote climate disclosure. Respondents from national financial regulatory authorities suggested that opinions on climate finance statistical methods should be sought from the financial statistics department (the Survey Department of the People's Bank of China).

At an operational level, respondents from regulator departments believe the Green Financial Information Disclosure Standard under the Construction Framework of the Green Finance Standard System has formulated a series of environmental information disclosure of relevant standards, and that this help accelerates the process of climate investment and finance work and reduces unnecessary repetitive work. Therefore, it is recommended adding climate

investment and finance-related information disclosure methods into the three sub-standards of Environmental Information Disclosure Standards for Listed Companies, Environmental Information and Performance Disclosure Standards for Financial Institutions and Environmental Benefit Disclosure Standards for Key Projects under the Construction Framework of Green Finance Standards System -- Green Financial Information Disclosure Standard.

A stakeholder from a local government considers that there is a lack of adequate information sharing to be able to connect different related regulatory coordination mechanisms. However, some places have already started to build information-sharing platforms and in some instances achieved a positive effect (such as the financial information sharing platform mechanism in Taizhou, Zhejiang), although the time lag of information transmission between different departments still has room for improvement. Inconsistencies exist in the statistical coverage of disclosed information in various departments. To more effectively supervise the flow of funds related to climate investment and finance and the climate benefits of projects, it is suggested that a set of the statistical system of climate investment and finance should be developed and that the statistical coverage, data and statistical methods are standardised.

The research team also suggests further in-depth investigation and exploration of the rationality of adding a climate investment and finance statistical detection platform, and including a relevant statistical system in the three sub-standards of Green Finance Statistical Information Sharing Platform, Statistical Standards For Green Financial Services and Statistical Standards for Environmental Benefits of Green Finance under the Construction Framework of Green Finance Standards System -- Green Financial Information Disclosure Standard. The information disclosure could take elements and formats from green finance as references.

As a series of risk management standards have been proposed in the Green Financial Standard System Framework, we suggest adding financial institution climate risk management and monitoring methods in the Environmental Stress Tests for Financial Institutions, and Environmental Risk Regulatory Standards under the Construction Framework of Green Finance Standards System -- Green Finance Risk Management and Guarantee.

As the above work of adding relevant contents of climate investment and finance to the relevant sub-standards of the green finance standards system involves specific details of the work on climate change, it is suggested that the Department of Climate Change of the MEE should guide the particular work, with a close examination of the final results.

3.1.3 Financial institutions

Currently, China has a significant gap in climate finance. The primary source of funds is a public financial investment. Still, the limited public funds and the traditional mode of financing cannot meet the growing financial needs of China's climate change work. Therefore, there is an urgent need to encourage more financial institutions and enterprises to invest in climate change projects. The critical reasons for financial institutions demanding climate investment and finance standards include a requirement to 1) increase business volume and improve investment returns; 2) carry out climate risk management and reduce climate risk; 3) assist investors in identifying climate-friendly investments; 4) improve the image of financial institutions through climate-friendly investment.

At present, most financial institutions have an insufficient understanding of climate investment and finance. Therefore, in the development of the climate investment and finance standards system, priority should be given to the development of climate investment and finance terminology standards, climate investment and finance classification and industry catalogue, as well as standard coding. Some managers from domestic financial institutions are

worried that some of the concepts of green finance standards are not unified, and that will be further reflected in climate investment and finance standards. The climate investment and finance standards are too complicated, and there is a concern on whether they can be recognised and used effectively at the grassroots level, such as local branches of banks, because of that complexity.

According to the research team, it is found that many international and domestic financial institutions generally adopt the internal standards of climate credit, bonds, funds, insurance and carbon market-related products and finance. Still, there is no authoritative unified standard, which may cause inconvenience to investors in the process of use. Therefore, we propose developing a unified set of business norms for various financing instruments (such as climate credit, climate bonds, climate funds, and climate insurance) currently used in the field of climate change, and gradually form standards. Based on the independent operation mechanism of the carbon market, developing a separate set of carbon finance and derivative product standards is suggested, highlighting its carbon emission reduction characteristics and climate benefits. For innovative financial instruments, such as climate trust[61] and climate finance lease which are rarely used at present, it is suggested that they can be used as a standard for future consideration in the construction of the large-scale application of the climate investment and finance standards system, and be supplemented according to specific needs.

Some stakeholders of commercial banks and multilateral banks (MDBs) believe that the implementation of climate investment and finance standards is a way to increase business volume, attract climate-friendly assets, enhance shareholder returns and increase the attractiveness of using bank credit while meeting the standards. Domestic bank stakeholders are not particularly motivated to actively research climate financial risks, mainly because loan

[61] Short-term products usually with collateral

terms are generally short (less than seven years). But they do believe that comprehensive climate risk management will be carried out if Chinese regulators have precise requirements. MDBs are more concerned about climate risks, particularly the impact on commercial and sovereign lending in less developed countries, and how to provide climate risk management to climate-vulnerable countries and regions through new insurance models.

International financial institutions, by contrast, are more focused on climate risk. The Risk Research Institute of the GARP (Global Association of Risk Professionals) surveyed 27 financial institutions[62] worldwide in 2019 and found that financial institutions, such as banks, identified climate risk as a financial risk and formally incorporated it into their risk management framework, with about 80% able to identify climate-related risks and opportunities and more than 26% having a dedicated climate risk function. However, the development of core climate risk management capabilities, such as development governance, disclosure and scenario analysis, is uneven among different international financial institutions, and the construction process of climate risk management frameworks varies greatly. Moreover, a significant number of companies still fail to recognise climate risks correctly[63]. Therefore, formulating a policy system for climate investment and finance in China is conducive to the establishment of a domestic climate risk management system and the improvement of the climate risk management system of international financial institutions.

Stakeholders from financial institutions believe the current green finance certification system is rather complicated with a lack of unified regulation and different certification bodies[64] each with differentiated methods and processes, as well as various reporting content

[62] It includes 20 banks and seven asset managers, insurers and financial market infrastructure companies.

[63] Of the 27 financial institutions surveyed, about 50% thought they had adopted a strategic approach to climate risk but had done little or nothing; very few institutions with strong responses have identified their climate risk response as CSR or financial risk.

[64] The international assessment of green bonds is mainly based on the GBP or CBS. Since 2016, more than a dozen third-party green bond certification institutions have emerged in China, including rating agencies, accounting firms, environmental assessment and environmental consulting companies, such as China Bond Rating Co.Ltd., China Chenxin Credit Rating Group, China Orient Asset Management Co. Ltd., PwC China and Lianhe Equator Environmental Impact Assessment Co., Ltd.

and formats. It is recommended that we follow the American financial statements form template - and regulate certification bodies (including third parties) through climate investment and finance standards - to promote a more friendly interface between the investment interface and the climate benefit assessment interface. More stakeholders from financial institutions consider there is a need to quickly develop standards for climate-friendly investments and financing services assessment, eligible requirements of project type and emission level and a "negative list" of projects.

They also generally agree that the most immediate benefit of adopting climate investment and finance standards is to enhance the image of institutions. International financial institutions are aware that climate financing work will directly affect their image among climate-friendly investors and affect their decisions. Green finance experts suggest that the climate investment and finance standards system should include voluntary and mandatory disclosure of climate information to help investors identify which institutions are climate-friendly.

In the future, a financial institutions' disclosure of climate information - as and when required - can improve the transparency of operation and management, and help financial regulators form an overall judgment on climate-related risks in the financial industry. Conducting climate information disclosure reveals the actual and potential financial impacts of climate factors on financial institutions' revenues, expenditures, assets and liabilities, as well as capital and financing, and ultimately support more appropriate risk pricing and capital allocation in the global economy. We propose to develop a system of climate information disclosure.

We also propose a climate disclosure regime. As the Green Financial Disclosure Standards of the Green Financial Standard System Framework has already formulated a series of relevant standards of environmental information disclosure, we recommended adding the corresponding

financial institution climate investment and finance information disclosure method in the sub-standards of Environmental Information and Performance Disclosure Standards of Financial Institutions under the Construction Framework of Green Finance Standard System -- Green Financial Information Disclosure Standard. The work will be carried out under the guidance of the Department of Climate Change, MEE, and will be confirmed later.

According to the Financial Stability Board (FSB) Task Force on Climate-related Financial Disclosures, TCFD released the report recommending that investors, lenders, insurance firms and other financial institutes conduct an appropriate evaluation of risks and opportunities associated with climate, and put forward the evaluation framework. The green financial information disclosure framework of TCFD can be used as a reference for the standard construction of climate investment and financing information disclosure.

A unified credit rating system and a set of appraisal standards can better provide a stable investment basis for capital markets to invest in climate change activities. Based on this, we suggest developing a climate credit rating system and an evaluation method for climate-friendly financial institutions to help investors identify climate-friendly projects and climate-friendly financial institutions.

3.1.4 Enterprises

At present, China's enterprises still lack awareness of climate investment or a drive to begin the process themselves. As a result, their participation in climate investment and finance is relatively low. To reduce the climate finance gap in China and relieve the pressure of public funds, financial institutions should be guided towards finance climate change projects, and enterprises should be encouraged to pay more attention to climate investment and finance and actively participate in climate change activities. It is thus necessary to formulate corresponding standards of climate investment and finance according to the nature and needs of enterprises.

Enterprises' demands for climate investment and finance standards mainly include: 1) supporting their investment decisions; 2) managing climate risks; 3) improving corporate image.

The main concern of industry stakeholders is how the climate investment and finance standards system could lead to policy support, such as linking to carbon markets, credit enhancement policies and subsidies. Industry respondents are particularly concerned about whether the future climate investment and finance policy system can connect with the carbon market, reduce the cost of climate-friendly projects and facilitate investment decisions. One industry observer suggests that climate investment and finance standards should be combined with substantial incentive policies to facilitate early and innovative demonstration projects to make investment decisions, provide standard guidance, and prioritise the use of climate funds for projects with significant emission reduction, innovation, demonstration benefits, and social value.

Respondents of energy enterprises are concerned about whether the climate investment and finance standards system will affect the asset value of enterprises and the constraint scenario of carbon dioxide emissions in the future. Therefore, the standards system needs to consider how to deal with the risk of climate transformation. There is still a lack of understanding of the management of climatic physical risks among enterprises, and no enterprise has formally assessed climatic physical risks. However, with disasters such as Typhoon Hato having brought significant economic losses to many enterprises, such enterprises need to recognise that coping with the risks of climate change is a critical element of their sustainable development[65]. We suggest that the climate investment and finance standards system should establish a set of management methods for enterprise climate risk.

[65] Ernst & Young. (2018). Adressing climate-related risks is key to long-term growth for companies and investors (应对气候相关风险是企业和投资者长期保持增长的关键). Sohu. Environment. Available at: https://www.sohu.com/a/278879907_676545

A majority of industry respondents are concerned about the accuracy and consistency of climate benefit assessment methods. We suggest that it is necessary to establish a basis for climate benefit and carbon emission reduction measurement and reporting guidelines based on existing carbon emission accounting methods. Some enterprises are concerned about whether the climate-friendly investment can deliver a positive corporate image, and establish a credible climate benefit assessment method and climate information disclosure method, which is conducive to improving the intangible value of corporate image for climate-friendly enterprises. A respondent from a state-owned enterprise suggests that the climate investment and finance standards should be aligned with the State-owned Assets Supervision and Administration Commission's (SASAC) audit indicators to encourage corporate executives to pay more attention to climate benefits and risks.

3.1.5 Climate-friendly investors

While there are a large number of foundations[66] and commercial funds in the world that are oriented to climate-friendly investment,[67] there is no group of climate-friendly investors in China at present. Meanwhile, multilateral financial institutions have facilitated the establishment of some climate funds, such as the Green Climate Fund (GCF) and the Green Environment Fund (GEF). Climate-friendly investors are an essential complement to climate policy, as some can accept lower returns or higher risks, providing incentives for additional climate benefits. Therefore, in addition to meeting the needs of government policy departments, the standards system must meet the needs of the concessional investment and finance of climate-friendly investors.

[66] Such as Gates Foundation, Hewlett Foundation and the recent USD 10 billion climate funds donated by the CEO of Amazon Jess Bezos.

[67] Hollands J. (2019). Top environmentally and socially conscious funds highlighted. What Investment. Available at: https://www.whatinvestment.co.uk/environmentally-and-socially-conscious-funds-2616807/

One multilateral financial institution stakeholder believes that almost all current criteria for green finance (such as green bonds) are merely statistics on the green nature of investment assets and do not calculate whether additional environmentally-friendly investments are generated. For climate investment and finance standards - in addition to the separate statistics of climate-friendly projects in the existing green finance statistics system - the assessment of real climate externalities should also be carried out as soon as possible as the basis for the implementation of climate investment and finance standards and policies. A Chinese climate fund manager believes companies should be pushed to prepare "carbon budgets", while another expert considers that climate-friendly investors also need improved disclosure systems and investment regulatory systems to ensure that climate-friendly funds are consistently used for projects with significant climate benefits and externalities. The expert believes that the assessment of additionality will be the core and vitality of climate investment and finance criteria.

In addition to climate-friendly investors, a large number of conventional commercial funds have signed up to proposals to divest from high-emission assets[68], so the climate investment and finance standards system should consider how to create a negative investment list. Respondents believe the listing of negative investment will trigger a significant debate in areas such as whether emission factor is the primary consideration, or should energy-saving and clean utilisation of coal be included, or whether partial reduction projects combining coal use and CCUS can avoid coal projects being added to the negative list. Meanwhile, three experts have suggested that traditional coal mining and utilisation projects should be added to the list of detrimental climate investments to increase their financing costs.

[68] Fossil Free Divestment. (2020). 1000+ Divestment Commitments. Fossil Free: Divestment. Available at: https://gofossilfree.org/divestment/commitments/

3.1.6 Other international users

China's national green finance standards, which are driven by government, differ in construction to international green finance standards such as the International Capital Market Association (ICMA) of the Green Bonds Principles and the UK climate bonds certification system of the Climate Bond Initiative (CBI), which are both driven by the non-profit institutions. International non-profit organisations are also significant forces in helping promote the change of financing behaviour of financial institutions and enterprises. The Climate Policy Initiative (CPI) in Germany and the Institute for Climate Economics (I4CE) in France both carry out national and international climate investment and finance research and statistics every year.

Officers of international non-profit organisations believe that the establishment of a sound climate investment and finance system in China is conducive to attracting more global investors to invest directly, or indirectly, in the Chinese market. In addition, some officers of such organisations believe there is a lack of an evaluation system for climate-friendly funds and equity. As a result, they expect China's climate investment and finance system to have clear criteria. Stakeholders of international non-profit climate finance organisations hope that China's climate investment and finance standards system will be integrated with the global green finance standards system, especially in the field of inclusion and information disclosure. In the scope of application of the standards system, some studies suggest covering the construction of the Belt and Road Initiative[69, 70] in China. With international attention focused on China's climate investment and finance standards system, it is suggested that the sub-standards of China's system should take into account the needs of the international market and

[69] Tsinghua PBCSF, Vivid Economics, Climate Works Foundation. (2020). Decarbonizing the Belt and Road: A Green Finance Roadmap. Available at: https://www.vivideconomics.com/wp-content/uploads/2019/09/Decarbonizing-the-Belt-and-Road--Final-Report-English.pdf

[70] Hallding K. (2017). China's Belt and Road Initiative – how can finance help to make it sustainable? . SEI Stockholm. Available at: https://www.sei.org/featured/chinas-belt-and-road-initiative-how-can-finance-help-to-make-it-sustainable/

the connection with international standards, giving full consideration to the needs of different users to establish an internationally-integrated and composite standards system.

3.2 Demand summary and classification

3.2.1 Demand summary

According to the survey results of different users of China's climate investment and finance standards system in the previous section, the demands of stakeholders are summarised in **Table 3-1**.

Table 3-1 Summary of user demand for the climate investment and finance standards system

Department/Institution	Involved climate investment and finance standards
National policy departments	Work plan for the establishment of a standards system for climate investment and finance; Guidance catalogue of INDCs supporting project ; Climate environmental benefits and carbon emission reduction measurement and reporting guidelines.
National regulators	Measures for the disclosure of climate information; Climate investment and finance statistics system.
Financial institutions	Work plan for the establishment of a standards system for climate investment and finance; Climate investment and finance product service standards; Measures for climate risk management and regulation of financial institutions; Measures for the disclosure of climate information; Credit rating system and appraisal standard.
Enterprises	Measures for enterprise climate risk management; Climate effect and carbon emission reduction measurement and reporting guidelines.
International institutions	Climate additionality assessment; The identification and classification of climate finance and the regulatory regime; Linking with relevant international standards for climate investment and finance.

3.2.2 Suggestions

According to the principles, literature review and stakeholder needs of the construction of the climate investment and finance standards system, and considering the relationship between climate investment and finance and green finance, it is suggested that:

1) Firstly, policymakers should take the lead in formulating a work plan for the construction of the climate investment and finance standards system, and guide the development of the relevant standards of climate investment and finance.

2) Among the demands of the climate investment and finance standards system, the related contents of climate investment and funding shall be added to the corresponding green finance standards. The final results shall be approved by the Department of Climate Change.

3) Among the demands for the climate investment and finance standards system that are not involved in the green finance standards system, they shall be independently formulated, with priority given to highlighting:

- Climate attributes;
- Relative emission reductions and the improvement level of climate adaptation benefits;
- Additionality, to promote real additional climate benefits;

Applicable standards for the functions of policymakers and regulators, and support the development of climate investment and finance in China through government policy.4) In addition to the connection with the green finance standards system, the climate investment and finance standards also need to consider the relationship with international standards of climate change and green finance and participate in the formulation of international standards, as well as the connection with other relevant standards, such as applicable industry standards, local standards, and enterprise standards.

Based on the above research, this project divides the requirements of the climate investment and finance standards system into two categories. The specific classification of the standards system and its subordinate first-level and second-level standards are shown in **Table 3-2**.

Table 3-2 Demand classification of standards system of climate investment and finance

Classification	Primary standard		Secondary standard
1. separate standards	1.1 Standards system construction work plan		- Climate investment and finance terminology - Classification and industry catalogue - Standards code
	1.2 Climate environmental benefits and carbon emission reduction measurement methods and reporting guidelines		- Measures for climate benefit assessment - Measures of externalities assessment
	1.3 NDCs supporting project guidance catalogue		
	1.4 Identification and classification of climate finance		
	1.5 Carbon finance and derivatives standards		
	1.6 Measures for enterprise climate risk management		
2. linking with other standards	2.1 Interface with green finance standards system[71]	Green financial product service standard	- Climate credit - Climate bond - Climate fund - Climate insurance
		Green credit rating and certification standards	- Climate credit rating system - The assessment method for climate-friendly financial institutions
		Green financial information disclosure standard	- Climate information disclosure system of listed companies - Climate information and benefits disclosure system of financial institutions - Measures for the disclosure of climate benefits of NDCs projects (key projects)
		Green finance statistics and Sharing standards	- Climate investment and finance statistical monitoring platform - Climate investment and finance statistics system - Climate benefit (carbon emission reduction) statistics
		Risk management and the guarantee of green finance	- Climate risk management in financial institutions - Regulatory standards for climate risk
	2.2 Interface with international standards	Interface with international ISO/DIS14097 standard (in preparation)	
		Interface with other international climate-related standards, such as the GBP, the EP4 and the CBS, and climate-related standards/guidelines issued by institutions such as the World Bank and the ADB.	
	2.3 Interface with other level standards	Interface with climate investment and finance-related industry standards, local standards and enterprises standards.	

[71] To speed up the work process of climate investment and finance and reduce repetitive work, it is suggested that relevant contents of climate investment and finance should be included in the corresponding sub-standards to be formulated in the framework of Green Finance Standard System. The work is recommended to be carried out under the direction of the DCC, which will review the outcome.

3.3 Relevant standards that are suggested to be added into the green finance standards system

Climate investment and finance is an essential part of the extensive green finance system. To better serve the government and financial institutions, this report suggests that **the construction of China's climate investment and finance standards system should be incorporated into the ongoing development and improvement of China's green finance standards system.** For those sub-standards of climate investment and finance that are conducive to the promotion of climate investment and finance but are challenging to be incorporated into the green finance system framework, it is suggested that relevant sub-standards shall be formulated separately under the guidance of the Department of Climate Change (DCC) of the MEE. Standards that serve international investors or climate-friendly investors should be driven by the market and counted by institutions researching climate investment and finance and be submitted to the DCC of the MEE and the People's Bank of China.

Based on the development of climate investment and finance products and services, this chapter reviews the relevant green finance standards. It proposes the key factors that need to be considered in incorporating the construction of climate investment and finance standards into China's green finance standards system. In addition, during the process of literature review, we also noted that climate change is an essential part of international green finance standards. In China, the green finance standards mainly serve the domestic demand for energy conservation, environmental protection and circular economy. Yet, the climate nature of the green finance classification remains unclear (see **Appendix 2**). Therefore, although most international green finance standards do not include "climate" in their titles, their development

process can still provide a reference for the construction of China's climate investment and finance standards.

3.3.1 Financial product standards

（1） Climate Credit

Credit[72] is a commercial bank's most traditional business and the primary source of profit, by taking deposits and making loans to earn interest. For the bank's proprietary loan, the most significant risk comes from the borrower unit if the individual cannot repay the loan (default), so the bank must reduce the default rate (or bad loan ratio) through credit risk management to improve the performance. According to the loan term classification, commercial bank loans can be divided into short-term loans (less than one year), medium-term loans (less than five years), and long-term loans (more than five years). The lifecycle of a loan[73] includes a series of precise steps which begin with the borrower's written application[74] followed by the bank starting to evaluate and investigate the legality and profitability of the project as well as the credit of the main body of the lender[75]. The next step sees both parties sign the loan contract after the approval; and then the bank tracks the enterprise according to the loan contract, such as the requirement of debt proportion or priority repayment. In the final step, when the loan is due, the borrower needs to perform the contract; otherwise, it will be considered as a default. However, the borrower can apply for an extension to the bank.

Currently, there are a large number of climate-related special credit operations in the world, yet there is still no uniform definition of "climate credit", and no country has formally put

[72] Lending entities include commercial banks, policy banks, credit cooperatives, and other institutions. See "Loan Statistics Classification and Coding Standards (Trial)" for details. People's Bank of China. (2010). Loan Statistical Classification and Coding Standards (Trial) . Website of the People's Bank of China. Available at: www.gov.cn/gzdt/att/att/site1/20100605/001143194d800d73f4b301.pdf

[73] The People's Bank of China promulgated the Commercial Bank Law in 1995. Guidance and restrictive provisions are made on the loan activities of commercial banks.

[74] For individual quality customers, the bank will take the initiative to offer loans.

[75] Follow the principle of separation of examination and approval of loans, the approval and issuer of a loan should be different departments, with their responsibilities respectively.

forward the concept of "climate credit". According to the Climate Policy Initiative (CPI), from 2015 to 2016, a commercial loan is the main instrument used to fund climate adaptation with an average of around USD 11 billion per year, mostly provided by multilateral Development Finance Institutions (DFI) and national DFIs. It is mainly used in projects to improve water facilities, water-intensive industry and other climate resilience of capital-intensive infrastructure projects[76]. Grants and low-cost loans (or concessional loans), with a total of around USD 5 billion, are usually provided by bilateral donors and climate funds to develop pilot projects, provide technical assistance and capacity building, or provide long-term and more affordable access to funds, thereby reducing the cost of investment and encouraging private investment in climate-friendly projects[77].

To curb the blind expansion of energy-consuming and polluting industries, China's State Environmental Protection Administration (SEPA), the People's Bank of China (PBOC) and the China Banking Regulatory Commission (CBRC) jointly proposed a new credit policy in July 2007 - the Opinions on Implementing Environmental Protection Policies and Regulations to Prevent Credit Risks - which initiated the green credit policy. The China Banking and Insurance Regulatory Commission (CBIRC) issued the Green Credit Guidelines[78] in 2012, in which a low-carbon economy and the avoidance of environmental risks are the main components. China's Green Credit Guidelines exclude fossil energy from the green credit system, in a highly forward-looking and guiding step. However, the current green credit system in China is still within the paradigm of the international green financial system, and there is no indication that green credit can bring additional environmental benefits. Most credit projects may take place under normal banking operations and without the label of "green credit". In

[76] Trabacchi C, Mazza F. (2015). Emerging Solutions to drive private investment in climate resilience. CPI.
[77] Ditto
[78] CBRC (now CBIRC). (2012). Notice of CBRC on the issuance of green credit guidelines (CBRC (2012) No. 4). State Council. Available at: http://www.gov.cn/gongbao/content/2012/content_2163593.htm

contrast, climate credit must be both climate-friendly and promote additional and real climate benefits.

Based on the survey, we propose to investigate user demands, and whether and how to include "China climate credit" as part of "China green credit". At the same time, we propose to differentiate between the additional environmental benefits of green credit and to consider disclosure to the public and financial providers of inclusion. Our research team suggest that China's climate credit sub-standards are required to count climate-friendly projects, and also to promote additional and realistic climate benefit assessments.

In practice, it is suggested that alongside the independent institutions approved by the CBIRC to determine whether the project has additionality, the CBIRC could have a further sub-division according to the project directory to encourage concessional loans from MDBs, national policy banks, and other climate-friendly investors. The research team suggests that the next stage is to understand users' comments for promoting the construction of relevant standards from the following three directions: (i) Establish a white list of **"climate-friendly credit statistics"** as part of the current green credit system to highlight projects with climate benefits; (ii) Extend the green credit system, establish the certification system of **"climate impact credit",** combine with climate-friendly investors and policy support, and focus on supporting credit financing projects with climate benefits and additionality[79]; (iii) Extend the green credit system, establish **a "climate blacklist[80]" or "credit climate risk assessment method"**, and encourage financial institutions to gradually remove non-essential emission intensive projects and climate-vulnerable financing that cannot adapt to climate change from the credit system, or increase their financing costs.

[79] Projects with additionality are projects that will not make investment decisions unless they are classified as "climate influence credit" products and supported accordingly. For relevant assessment method please see Figure 3-5.

[80] The implementation of the "climate blacklist" could create climate additionality.

（2） Climate bonds

A bond is an obligation issued to investors to raise funds, where the issuer promises to pay interest and the principal at maturity on the face value, coupon rate, repayment period and payment of interest. The credit level of the bond issuer and the risk-free interest rate of the issued currency (e.g. the interest rate of the central bank or Treasury bonds) are the main factors affecting the bond price (or the yield). The issuer's credit rating reflects the level of credit, which measures the probability that the bond will not be repaid due to the issuer's default. Bond issuers include national governments and their subordinate units, local governments and their subordinate units, enterprises, financial institutions and multilateral institutions. Bonds can be classified by the issuer and issue currency, interest rate or term.

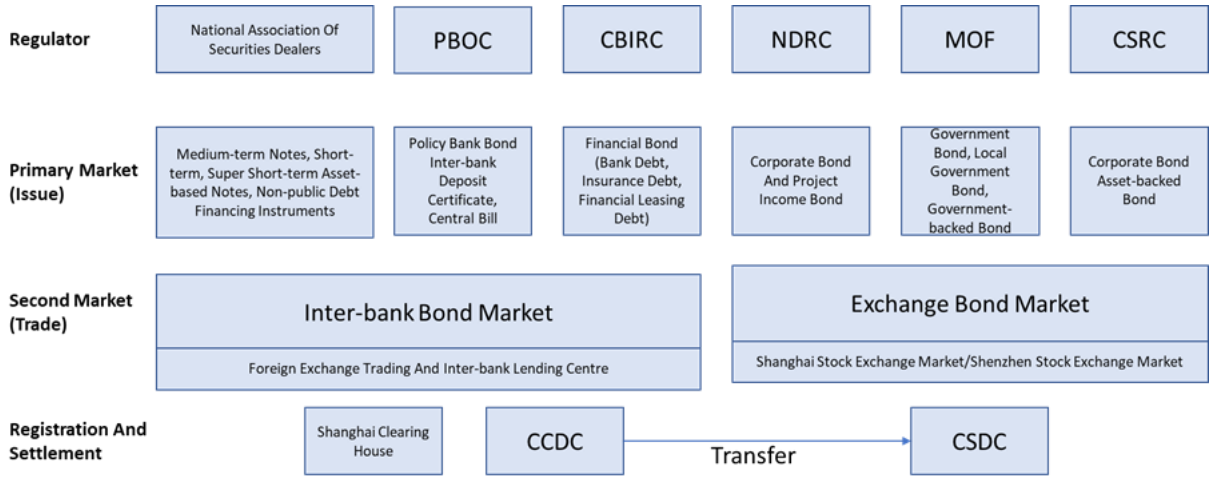


Figure 3-1 The basic structure of China's bond market

The bond price level is influenced by the issuer's credit level, the interest rate of the repayment period, the length of the repayment period and other factors. Thus it is not meant to compare the prices of different types of bonds simply. Investors typically quote bonds at its yield. The calculation method of bond yield can be divided into the current yield (bond interest divided by the bond price) and yield to maturity (the return rate over its maturity).

Although the CBI and the ICMA have used the term "climate bond" or "climate resilience bond", there is no unified international definition of "climate bond"[81]. And while national and international green bonds standards do cover climate change, we suggest that it is necessary to separate statistics related to climate-friendly bonds varieties. Those who do not belong to the green bonds standards but meet the climate-friendly nature should also be included in the statistics. **We initially propose the establishment of "China climate bond statistics" as a sub-category of China's green bonds, as well as the "China climate impact bond" ("climate impact bond"), which highlights the additionality.** The former is similar to existing green bonds, while the latter will not be numerous but represent projects in urgent need of policy or financial support. To support the successful issuance of China's climate impact bond and the realisation of climate-friendly investments, issuers and financial institutions shall try to link various government policies (such as interest discounts, tax cuts and green channels of issuance) with support from multilateral institutions (such as grants and low-interest loans). There is, therefore, a need to understand the demands of policymakers and multilateral institutions for bridging various types of bonds with additional climate benefits.

During this consultation stage, the research team will discuss with stakeholders from relevant departments of the Chinese government on how to demonstrate and ensure real additionality, and how to ensure that the funds and policies used to encourage climate change will not be used for projects without additionality. For "climate impact bonds", which need policy support, policymakers and standard users should discuss how to establish a rigorous post-issuance Monitoring, Reporting and Verification (MRV) mechanism for funds use, to ensure that bonds to raise funds for projects come with additional climate benefits.

[81] The UK non-profit climate bond initiative (CBI) has developed a certification system for "climate bonds", but it is still essentially a green bond, including green projects that do not have direct climate benefits.

Climate-friendly project additionality illustration: hypothetical case

Assuming an onshore wind project in Guangdong plans to raise CNY 1 billion, the project internal rate of return (IRR) is 5%, equity investors demand a rate of return of 10%. The project enterprise is issuing a 20-year climate bond with a par value of CNY 800 million in the market for debt financing, while the outstanding amount is equity financing. The coupon is 6% per year (paid by the end of each year, according to the enterprise's cash flow situation), the yield to maturity in the market is 6%, and the cost of financing is 1% of the total amount. If a subsidy of 1% of the face value is provided, the tax rate is 20%. The successful implementation of the project depends on whether the financing cost is lower than the IRR. How much capital can the enterprise raise? What strategy should be adopted to design the bond issue? Can the project be implemented successfully? What strategy should be adopted to develop the bond issue? Can the project be implemented successfully under the three scenarios below?

Scenario 1: base scenario, without interest subsidy or climate-friendly investor

Scenario 2: with interest subsidy only

Scenario 3: with climate-friendly investor only

$$\text{under scenario 2 of interest subsidy,}$$

$$F_0 = \frac{A}{(1+y)^L} + \sum_{n=0}^{L} \frac{C_n}{(1+y)^n} + \sum_{n=0}^{M} \frac{S_n}{(1+y)^n}$$

$$= \frac{8}{(1+6\%)^{20}} + \sum_{n=0}^{20} \frac{0.48}{(1+6\%)^{20}} + \sum_{n=0}^{20} \frac{0.08}{(1+6\%)^{20}} = 892 \text{ million CNY net value}$$

$$\text{under the scenario 1 of withouth interst subsidy,}$$

$$F_0 = \frac{A}{(1+y)^L} + \sum_{n=0}^{L} \frac{C_n}{(1+y)^n} = \frac{8}{(1+6\%)^{20}} + \sum_{n=0}^{20} \frac{0.48}{(1+6\%)^{20}}$$

$$= 800 \text{ million CNY net value}$$

Scenario 1: if the enterprise issues bonds at 6% interest rate, it will raise CNY 792 million (minus 1% of the issuance fee). The actual pre-tax financing cost calculated by Excel is 5%

(deduct 1% of the issue costs), and the remaining CNY 208 million requires equity financing.

The weighted average cost of capital (WACC) is

$$Z = w_e \times r_e + w_d \times r_d \times (1 - q) = (2.08 \div 10) \times 10\% + (7.92 \div 10) \times 5.08\% \times (1 - 20\%) = 5.30\% > \text{the Project IRR} = 5\%$$

Therefore, **in Scenario 1, without interest subsidy, the project is not economically feasible, and the WACC is higher than the IRR of the project. At the same time, the emission factor of this project is far lower than the average emission factor of the local power grid, that is, it brings emission reduction, which means it has climate additionality. The bond issue can be classified as a climate impact bond.**

Scenario 2: if the enterprise issues bonds to raise funds at 7% interest (considering 1% interest discount), it will raise CNY 883 million (minus 1% issuance fee). The actual pre-tax financing cost is 5.16% calculated in Excel, and the remaining CNY 117 million requires equity financing.

The WACC is

$$Z = w_e \times r_e + w_d \times r_d \times (1 - q) = (1.17 \div 10) \times 10\% + (8.83 \div 10) \times 5.14\% \times (1 - 20\%) = 4.8\% < \text{the project IRR} = 5\%$$

Raising funds at higher interest rates in this context will reduce financing costs and promote the economic viability of the project.

If there is no interest subsidy policy, the weighted cost of capital will rise to 5.3%, much higher than the project IRR, and the project is not economically feasible. Therefore, this assumption contributes to the additionality of climate project investment in the subsidy scenario of climate bonds, and the project changes from economically "unfeasible" to "feasible".

Scenario 3: If climate-friendly investors (such as the multilateral bank, the climate-

friendly foundation) are willing to provide CNY 800 million of low-interest loans at a 4% interest rate, the remaining CNY 200 million will be equity financing.

The WACC is

$$Z = w_e \times r_e + w_d \times r_d \times (1 - q) = (2 \div 10) \times 10\% + (8 \div 10) \times 4\% \times (1 - 20\%) = 4.56\% < \text{Project IRR} = 5\%$$

The low-interest loan support will reduce the project financing costs, and promote the economic feasibility of the project.

Without the low-interest loan policy, the weighted cost of capital would rise to 5.3%, higher than the project IRR, making the project not financially feasible. Therefore, **in Scenario 3, low-interest loans to climate bonds promote the additionality of investment in climate projects, which move from economically "unfeasible" to "feasible".**

The above illustrative analysis is based on a baseline scenario of economically unfeasible projects. **If low-interest loans or discount policy support are provided for projects that are already economically viable, it means that no additional emission reduction will be achieved, and it will be a waste of climate policy and funds.** In addition to linking policy, policy funding, and climate-friendly investor and additionality assessments, businesses may have an incentive to conduct additionality assessments and disclosures to enhance their image if they lower the threshold rate of return to subsidise the climate-friendly projects or cutting-edge climate-friendly technologies.

（3） Climate funds

Funds are the vehicle through which investors' capital enters the market, and offer an indirect investment approach for investors. General Partner (GP) collects investors' funds by issuing fund units, which are managed by fund custodians (i.e. qualified financial institutions), and distributed by fund managers to invest in stocks, bonds and other financial instruments,

and then share investment risks and profits. Funds established by the public sector often provide policy investments and grants in addition to commercial investments, and often in industries and regions with requirements.

The fund classification is mainly based on the asset allocation ratio, performance comparison benchmark and investment target determined in the prospectus, as these represent the commitment of the fund to investors and constitute the fundamental constraint on the future investment behaviour of the fund manager. Generally, commercial funds pursue superior returns relative to the market (such as the top five annual returns of similar funds); hedge funds and some private funds set the target of absolute returns (such as more than 20%), and policy funds often have goals related to social benefits.

Climate funds can be divided into commercial climate funds (such as those set up by commercial banks) and policy climate funds (including local climate industry funds, climate funds set up by multilateral institutions, climate funds set up by enterprises from the perspective of sustainable development, and climate funds set up by charitable individuals). Since the United Nations Framework Convention on Climate Change (UNFCCC) introduced the concept of "climate finance" during negotiations on financial mechanisms at the Conference of the Parties (COP), a series of multilateral, unilateral and commercial "climate funds" have been set up.

Multilateral climate funds have been playing an essential role in addressing climate change, especially in implementing financial support from developed countries to developing countries. For example, in 1991, the World Bank established the Global Environment Facility (GEF)[82]. In 2001, COP7 of the UNFCCC decided to build the Special Climate Change Fund

[82] World Bank. (2020). The Records of the Global Environment Facility. The World Bank. Available at: https://www.worldbank.org/en/about/archives/history/exhibits/the-records-of-the-global-environment-facility

(SCCF) and Least Developed Countries Fund (LDCF) as operating entities[83] of relevant climate finance mechanisms. The COP16 of the UNFCCC, held in Cancun, Mexico, in 2010, decided to establish the Green Climate Fund (GCF)[84]. In terms of commercial funds, HSBC set up a climate change global equity fund[85] in 2008. And in 2007, seven ministries, including the Ministry of Finance and the NDRC, launched the Clean Development Mechanism Fund, which was the first climate fund[86] set up by the Chinese government.

Despite the establishment of the above-mentioned multilateral funds (as shown in **Table 3-3**), **there is currently no unified international definition of climate fund, no standard for the evaluation and classification of climate fund, and no certification system related to the climate fund.** Take HSBC's global climate change equity fund[87] as an example - by March 30, 2020, Microsoft and Samsung Electronics were among the top 10 investment stocks, yet how these companies bring about climate benefits was not reported.

Also, apart from some climate funds set up by multilateral institutions (such as the Global Environment Facility[88] and the Green Climate Fund[89]), which claim to consider additionality, most climate funds have no procedures for assessing additional climate benefits, nor do they disclose the lack of assessment, which could be wasteful if it involves concessional investors. For policy funds, such as the climate fund that provides assistance to developing countries, transparency and effectiveness in the use of funds are also factors of concern to investors and policymakers.

[83] GEF. (2010). Least Developed Countries Fund (LDCF) and Special Climate Change Fund (SCCF). GEF. Available at: https://www.thegef.org/sites/default/files/council-meeting-documents/LDCF-SCCF-22Feb2010_5.pdf

[84] UNFCCC. (2019). Green Climate Fund. UNFCCC. Available at: https://unfccc.int/process/bodies/funds-and-financial-entities/green-climate-fund

[85] Morningstar. (2020). HSBC Global Investment Funds - Global Equity Climate Change EC (SGD). Morningstar. Available at: https://www.morningstar.co.uk/uk/funds/snapshot/snapshot.aspx?id=0P000132FL&tab=4

[86] China clean development mechanism fund. (2020). Available at: http://www.cdmfund.org/zh/gywm/index.jhtml

[87] Financial Times. (2020). HSBC Global Investment Funds - Global Equity Climate Change AC. Market Data: Funds. Available at: https://markets.ft.com/data/funds/tearsheet/summary?s=lu0323239441:usd

[88] Global Environment Facility (GEF). (2018). An Evaluative Approach to Assessing GEF's Additionality. GEF. Available at: https://www.thegef.org/sites/default/files/council-meeting-documents/EN_GEF.ME_C.55.inf_.01_Additionality_Framework_November_2018.pdf

[89] Green Climate Fund (GCF). (2020). GCF Handbook. GCF. Available at: https://www.greenclimate.fund/sites/default/files/document/gcf-handbook.pdf

Table 3-3 A glance of some of the significant multilateral climate funds

(Unit: million USD)

Name of the fund	Use	Pledge	Balance	Approved	Expenditure	Update date
Adapt to Smallholder Agriculture Program (ASAP)	Adaptation	381.67	330	307	60.08	11/2018
Adaptation Fund	Adaptation	755.46	755.46	531.57	305.62	11/2018
Amazon Fund	Mitigation-reducing carbon emissions from deforestation and forest degradation	1748.37	1217.95	717.13	437.40	11/2018
BioCarbon Fund	Mitigation-reducing carbon emissions from deforestation and forest degradation	351.93	190.64	81.29		11/2018
Clean Technology Fund（CTF）	Mitigation	5461.91	5462.63	4989.40	1531.26	11/2018
Congo Basin Forest Fund (CBFF)	Mitigation-reducing carbon emissions from deforestation and forest degradation	186.02	164.65	83.11	62.55	10/2015
Forest Carbon Partnership Fund - Carbon Fund (FCPF-CF)	Mitigation-reducing carbon emissions from deforestation and forest degradation	889.51	538.33			11/2018
Forest Carbon Partnership Fund (Readiness Fund)	Mitigation-reducing carbon emissions from deforestation and forest degradation	430.03	416.51	531.55	447.13	11/2018
Forest Investment Programme (FIP)	Mitigation-reducing carbon emissions from deforestation and forest degradation	735.74	735.74	567.29	168.07	11/2018
Global Climate Change Alliance (GCCA)	Multi-focus	1332.91	1332.91	455.97	172.75	06/2017
Global Energy Efficiency and Renewable Energy Fund（GEREF）	Mitigation	281.50	275.50	223.59	89.07	05/2017
Global Environment Fund (GEF4)	Multi-focus	1082.98	1082.98	966.72	961.26	11/2018
Global Environment Fund（GEF5）	Multi-focus	1152.41	1147.92	853.8	500.75	11/2018
Global Environment Fund（GEF6）	Multi-focus	1117.16	1109.43	895.21	208.07	11/2018
Global Environment Fund（GCF）	Multi-focus	10302.30	7234.24	4604.50	391.77	12/2018
Indonesia Climate Change Trust Fund（ICCTF）	Multi-focus	26.17	16.71	14.24	7.69	05/2017
Least Developed Countries Fund（LDCF）	Adaptation	1371.72	1317.18	1219.8	531.86	11/2018
MDG Achievement Fund	Adaptation	89.50	89.50	89.52	82.52	10/2015
Partnership for Market Readiness	Mitigation	129.60	120.3	86.92		11/2018
Pilot projects for climate recovery（PPCR）	Adaptation	1154.66	1154.66	960.43	390.23	11/2018
Scaling Renewable Energy Program（SREP）	Mitigation	744.54	744.54	591.8	55.21	11/2018
Special Climate Change Fund（SCCF）	Adaptation	371.06	366.06	285.65	186.79	11/2018
UN-REDD Programme	Mitigation-reducing carbon emissions from deforestation and forest degradation	319.55	308.46	316.57	289.48	11/2018

The research team proposes that potential users and stakeholders of the standards should discuss the climate fund certification standard system in China, including how to clear the fund types and purposes, how to account for the climate benefit of climate funds, and how to ensure that various policy support for climate funds can produce real and additional climate benefits through the assessment of climate fund additionality. At the same time, we should learn from the experience of China's clean development mechanism fund and study whether there is a need to carry out carbon emission reduction budgets[90]. Through this consultation, the research team hopes to understand whether the funds that claim "climate fund" but do not meet the standard requirements should be excluded from climate fund certification or put on the negative list for the reference of climate-friendly investors. The team proposes to study the development of a standards system for China's climate funds to help investors identify and evaluate different types of climate property funds, which may or may not be named after the climate fund. Through this survey, the project team hopes to understand the suggestions on the following principal contents of the climate fund, including:

- How to define and identify a climate-friendly fund or climate fund;
- How to carry out statistics on climate-friendly investment of the fund, how to count climate-friendly investment quota and climate benefits in the fund portfolio, and whether to require the invested units to prepare carbon emission reduction budgets to achieve timely and accurate disclosure;
- Whether to conduct climate impact fund certification, identify and monitor climate funds with significant climate benefits and additional features;
- How to monitor and track the needs of policy support and climate-friendly investors;
- How to evaluate, count and track funds that claim to avoid high-carbon investments.

[90] China clean development mechanism fund management centre. (2019). China clean development mechanism fund green innovation business operation guide (trial). Available at: http://www.cdmfund.org/u/cms/www/201910/12094335wblk.pdf

（4） Climate insurance

Climate risk insurance is a risk transfer mechanism, which aims to compensate policyholders when certain climate-related events occur, thus dispersing the loss caused by humans and events. Climate risk insurance can be triggered by an accident, in the same way as property or catastrophe insurance, or it can be covered by an "exponential" or "parametric" mechanism. This mechanism is implemented when certain conditions (such as rainfall[91], severe weather[92], wind speed[93], or the rate of vegetation greening in a particular geographical area) are beyond the range of predetermined parameters.

Climate risk insurance can be divided into direct climate risk insurance or indirect climate risk insurance. Direct insurance can provide opportunities to improve economic efficiency and create social value. The policyholder of indirect climate risk insurance is insured by the national or local government from a macro perspective, indirectly assisting enterprises and individuals affected by climate change.

Indirect insurance can make better use of national channels to support large numbers of people with insurance funds. It is optimistic that the catastrophe risk cooperation mechanism in the Caribbean Bay, Africa and the Pacific could increase the indirect insurance support to 400 million people between 2016 and 2020[94]. Climate risk insurance can be carried out on three levels:

- Personal insurance: a form of direct insurance in which an individual (such as a farmer) receives compensation directly from his or her policy. These policies may be sold or

[91] Financial Times. (2019). Rain insurance could keep campers happy. Financial Times. Available at: https://www.ft.com/content/ad6cb5fe-f663-11e9-9ef3-eca8fc8f2d65

[92] Event Insurance. (2020). Adverse Weather Insurance. Available at: https://www.events-insurance.co.uk/adverse-weather-insurance

[93] NatureSave Insurance. (2020). Wind Turbine Insurance. Available at: https://www.naturesave.co.uk/renewable-energy-insurance/wind-turbine-insurance-2/

[94] GIZ. (2016). Climate Risk Insurance: For Strengthening Climate Resilience of Poor People in Vulnerable Countries. A Background Paper on Challenges, Ambitions and Perspectives. Available at: https://www.giz.de/en/downloads/giz-2016-en-climate_risk.pdf

distributed through platforms such as farmers' cooperatives, insurance salespeople or non-profit organisations.

- Institutional insurance: it refers to an indirect form of insurance that is paid out by "risk platforms" holding insurance policies, such as financial institutions, cooperatives, credit unions and non-profit institutions that provide services to individuals. In practice, this usually applies to lenders ensuring their loan portfolios.
- Government insurance: an indirect form of insurance that the policyholders are the government or other national level holders, providing emergency funding through reimbursements without cutting their regular budgets. These programmes are increasingly carried out through regional risk alliances, such as the African Risk Capacity, the Caribbean Catastrophe Risk Insurance Fund and the Pacific Disaster Risk Assessment and Financing Initiative. Disaster relief projects following natural disasters are primarily the responsibility of the government, often providing donor assistance after major weather events such as hurricanes and floods. However, the insurance industry also plays an essential role in the design and management of publicly supported post-disaster relief programs.

A typical insurance product development program consists of five stages, as shown in **Figure 3-2**. The initial step is risk identification and risk analysis.

Figure 3-2 Typical insurance product development process

Climate-specific risk characteristics are considered a prerequisite for insurance to be a suitable risk transfer mechanism, including four factors: proximate cause, contingency, pricing, and commercial viability, as detailed below. However, certain risks that do not have the following characteristics in certain circumstances can sometimes be insured[95].

Proximate cause: must be able to determine the risk or proximate cause of the loss. Climate change, 450 ppm or 2° C average temperature rise, is hardly a proximate cause of climate insurance, which means most climate insurance is indirect. Extreme weather events caused by climate change - such as typhoons, droughts and floods - can be proximate causes.

Contingency: the loss must be the result of what may or may not occur, and the loss shall not be under the control of the insured. The insured's control over the contingency of loss, and moral hazard will undermine the ability of insurance to act as an appropriate risk transfer mechanism.

Pricing: losses need to be quantifiable. Insurers must be able to set the values of critical variables, such as the range and probability of loss events. Ideally, a large number of similar incidents have occurred, allowing for a reasonable estimate of the damage. The long-term nature of climate change presents pricing challenges. For disasters caused by extreme climate change (physical climate risk) and rising carbon emission costs caused by the transformation and upgrading of the low-carbon economy (climate transition risk), just how to quantify future losses will be a challenge for traditional insurance models that rely on historical data pricing.

Commercial viability: policies should not be priced too high relative to potential losses. Otherwise, compared with other risk management mechanisms, such as self-insurance, contractual arrangement, hedging or risk reduction through technical measures, the policyholder will not consider insurance as a better risk transfer mechanism. As a whole,

[95] Vaughan EJ, Vaughan TM. (2002). Fundamentals of Risk and Insurance . Wiley Online Library.

insurance should be an effective way to transfer capital risks. Another function of insurance is to make "price discovery" through premiums, to make companies aware of the additional costs of climate risk, and to lower the potential premium rate by supporting the decision to invest in climate risk management.

The typical life-cycle of non-life insurance is divided into six phases, as shown in **Figure 3-3**. When dangers are determined to be "insurable," the peril pays premiums for risk transfer. When this event occurs, the insured may apply for a claim. The insurance company must assess the damage, determine the amount of compensation, and settle the claim. The insured shall receive payment according to policy conditions.

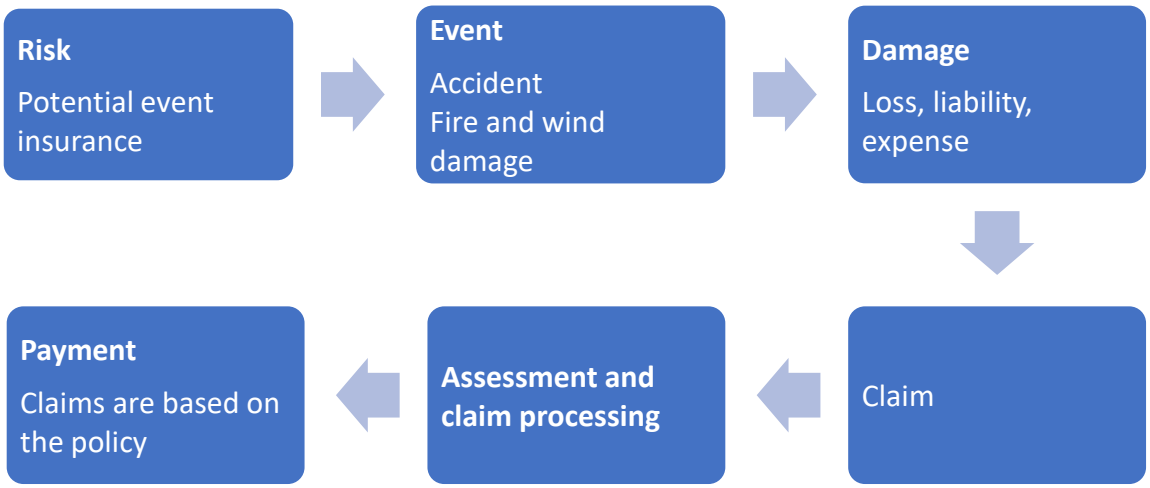


Figure 3-3 An overview of the non-life insurance life cycle [96]

Traditional forms of insurance (such as property loss or third-party liability) are not always the most appropriate technology for dealing with different risks. As a result, Alternative Risk Transfer (ART) mechanisms have been developed to accommodate new risk transfer requirements, such as covered bonds, risk reciprocity, CAT bonds and other structured financial products. These products do not belong to the traditional sense of insurance but also have a

[96] LIANG X. (2019). Training course: Introduction to climate investment and finance (resourced from Olivieri and Pitacco, 2011: 53-54).

similar insurance risk transfer function.

The research team will systematically investigate the potential users of climate insurance and suggests that the relevant standards of "China climate insurance" be included in "China green insurance" as a part of the standard. The unique attributes of climate change should be fully considered when formulating the relevant standards of climate insurance. The research group hopes to learn about:

- Whether innovative insurance models should be applied, since traditional insurance is not suitable for the slow-moving events brought about by climate change, such as sea-level rise and desertification. What are the alternative risk transfer mechanisms that should be used as broad instruments of climate insurance, such as climate catastrophe bonds and weather futures?
- Whether it is necessary to build the capacity of actuarial industry employees.
- How to encourage the market to explore positive incentives for climate risk reduction investments and climate insurance premiums, and to encourage insurance companies to implement lower premium rates for climate risk management excellence programs.
- How to avoid reducing climate risk for global low-income people through climate insurance and prevent poverty caused by climate change.
- Explore how to improve Post Event Review Capability (PERC), gain an in-depth understanding of best practices for climate risk impacts and mitigation capabilities, and provide a platform for knowledge exchange and advice.

Climate insurance application case study: catastrophe bond

In addition to traditional insurance instruments, some innovative financial products, such as disaster bonds and weather futures, have also created new approaches to climate risk management. A catastrophe bond is a high-yield debt instrument, usually linked to insurance, and designed to meet the need for capital in the event of a natural disaster, such as a hurricane or an earthquake. This type of insurance generally has special clauses that allow the issuer to defer or even waive its obligations to service principal and interest if it suffers losses as a result of a given natural disaster. Insurance companies developed disaster bonds as a way to spread risk after hurricanes in the United States in the early 1990s made it difficult for insurance companies to payout.

As stormy weather becomes more frequent in the northern hemisphere, insurance companies are facing massive potential insurance payouts. By issuing insurance-related bonds, insurers can transfer repayment risk to investors. As for investors, they will directly face the destructive force of mother nature on their capital while obtaining high returns. Allstate Insurance, one of the world's top 500 companies, issued large-denominational disaster bonds to cope with hurricane risks, with a total premium of USD 30 billion in 2015. It analysed the losses caused by extreme weather disasters through scientific models of climate change and historical data[97]. In the wake of that Allstate, Citizens Property Insurance, Florida's biggest Property insurer, sold USD 1.5 billion in catastrophe bonds, the largest ever for a single issue[98]. It is expected that disaster bonds will have the potential to be more widely used in the future to

[97] Cyou. (2016). Could Insurance Companies be the Solution for Climate Change? Available at: https://digital.hbs.edu/platform-rctom/submission/could-insurance-companies-be-the-solution-for-climate-change/

[98] Adams, M. (2014). Florida's Citizens Readies $1.5 Billion Catastrophe Bond Deal. Available at: https://www.insurancejournal.com/news/southeast/2014/04/28/327548.htm

cope with climate change and stimulate risk management through the securitisation[99] of climate risks.

Climate insurance application case study: weather futures

Weather futures trade on the same principle as other futures. At the beginning of each month, futures market authorities set an initial value for the number of cooling or warming days, such as 40 degrees Fahrenheit, based on the monthly temperature over the past ten years. To make the market work, the designated "market maker" will then call out the "offer", which is slightly lower than the initial value, and the "offer", which is slightly higher, which is the degree to which an investor can buy or sell. These values can fluctuate over a month as the weather changes and markets react. At the end of the month, the exchange settled on the actual temperature, cashing out all futures contracts for USD 20 for one-degree Fahrenheit[100]. What an enterprise that is significantly affected by temperature should do is develop a strategy to use weather futures to manage risks, and then carry out "weather futures" long or short to manage risks.

Although there are not many exchanges around the world to launch "weather futures" products, the launch of weather index futures is based on a good market. Many energy companies are facing weather changes causing the risk of sales to vary widely. In addition, because there are a variety of weather risk influences on the economy, the operation of many industries are affected directly by the weather, such as in crop production areas, planting season

[99] Caldecott, B. Robins, N. (2014). Greening China's Financial Markets: The Risks and Opportunities of Stranded Assets. Synthesis Report (绿化中国的金融市场： 搁浅资产的风险与机遇. 简要报告). Available at: https://www.smithschool.ox.ac.uk/research/sustainable-finance/publications/Greening-Chinas-Financial-Markets-Chinese-version.pdf

[100] CME Group. (2020). US Monthly Weather Heating Degree Day (HDD) Contract Specs. Available at: https://www.cmegroup.com/trading/weather/temperature/us-monthly-weather-heating_contract_specifications.html

rainfall influence on crop yield, and annual rainfall influencing electric power enterprise costs. Management tools for these risks already exist in the Over the Counter (OTC) market and have excellent prospects for development. With increasingly comprehensive and standardised risk management tools, these weather-related financial products are likely to be designed and applied.

3.3.2 Methods for climate assessment and identification

Climate assessment and identification methods and a climate-friendly certification system are of vital significance to the high-quality development of climate investment and finance. They not only meet China's demand for building a transparent and efficient credit supervision system but also guide financial institutions to invest in high-quality climate projects and improve the financial ecological environment. Some international rating agencies have incorporated climate risks and responsibilities into the credit rating system[101].

Although the "credit" of the environment and climate differs from the "credit" of the financial sector's ability to repay, the incorporation of climate change factors into the social credit system will, in the long run, be conducive to improving the strength of the units concerned to cope with climate change. In 1999, China put forward the concept of a social credit system for the first time and regarded it as a fundamental solution to rectify and standardise the order of the market economy. Issued in 2014 as the first national top-level design guidance document, "Social Credit System Construction Planning Outline (2014-2020)" [102] focuses on four significant areas of government integrity, business integrity, social integrity and judicial integrity, and takes "environmental protection and energy conservation" as one of the critical points of social integrity. From 2016 to 2017, China established a basic framework

[101] Shafroth, F. (2016). Climate Change and Credit Ratings. Governing. Available at: https://www.governing.com/columns/public-money/gov-climate-change-credit-ratings.html

[102] State Council. (2014). Social Credit System Construction Planning Outline (2014-2020) (社会信用体系建设规划纲要（2014—2020 年）). Available at: http://www.gov.cn/zhengce/content/2014-06/27/content_8913.htm

for joint credit punishment[103], refined the punishment measures, and formulated a unified standard[104] for the recognition of a red credit blacklist, further guiding the member units of the social credit system to carry out credit construction. In 2019, the State Council focused on strengthening credit supervision. That involved innovating the concept, system and method of supervision, and establishing and improving a new type of supervision mechanism that runs through the entire life-cycle of market players and links up the whole process of feedforward, concurrent and feedback monitoring[105], to further standardise market order and promote high-quality development. In addition, the Social Credit Law of the People's Republic of China has been drafted and widely consulted, and substantive steps have been taken in the credit legislation at the central and local levels.

In recent years, against the background of social credit system construction and green development, China has introduced some relevant policies and measures. The Measures for Enterprise Environmental Credit Evaluation (Trial Implementation)[106] establishes the division of responsibilities for relevant work, defines the scope of enterprises that should be included in environmental credit evaluation, formulates the grades, methods, indicators and procedures for enterprise environmental credit evaluation, and details specific measures for "encouraging enterprises to be honest and punishing those dishonest" for environmental protection. The Guiding Opinions on Strengthening the Construction of Enterprise Environmental Credit

[103] State Council. (2016). The guiding opinions on establishing and improving the joint incentive system of honest and the joint punishment system of dishonest to accelerate the construction of social integrity (关于建立完善守信联合激励和失信联合惩戒制度加快推进社会诚信建设的指导意见). Available at: http://www.gov.cn/zhengce/content/2016-06/12/content_5081222.htm

[104] NDRC, PBOC. (2017). Guidelines on strengthening and standardising the management of the list of targets for the joint incentive of honest and the joint punishment for dishonest (关于加强和规范守信联合激励和失信联合惩戒对象名单管理工作的指导意见). Available at: http://www.gov.cn/xinwen/2017-11/03/content_5237087.htm

[105] State Council. (2019). Guiding opinions on accelerating the construction of a social credit system and building a new supervision mechanism based on credit (关于加快推进社会信用体系建设 构建以信用为基础的新型监管机制的指导意见). Available at: http://www.xinhuanet.com/politics/2019-07/16/c_1124760603.htm

[106] MEE, NDRC, PBOC, CBRC. (2013). The circular on the issuance of the measures for enterprise environmental credit evaluation (trial) (NDRC (2013) No. 150) (关于印发《企业环境信用评价办法（试行）》的通知 (环发〔2013〕150 号)).

System[107] emphasise the establishment and improvement of the enterprise environmental credit record, disclosure system and evaluation system, and further refines the incentive mechanism for enterprises to maintain their environmental protection and the punishment mechanism for breaking that trust. In 2019, the MEE published the Regulatory Measures for Construction Project Environmental Impact Report (table) Preparation[108] and supporting documents[109], and launched the first national ecological environment unified credit management system - an environmental impact assessment credit platform[110], which was synchronised and enabled on 1st November. It speeds up the formation of the regulatory system for construction project environmental impact report (table) preparation.

Climate change and environmental credit are still difficult to connect with the conventional national credit system. The research team proposes to study how to carry out climate assessment and accreditation and the certification methods of climate-friendly financial institutions and incorporate them into the green finance standards system – which is currently under construction and improvement - as part of the relevant green certification standards in China. It is suggested that the related work should be guided by the DCC.

Based on the construction and implementation experience of relevant environmental assessment methods, we hope to carry out the following work through the consultation of this report when studying the demand for China's climate assessment and identification methods:

- To explore how to formulate climate assessment and identification methods and give enterprises incentives with a better level of evaluation and disclosures, e.g. reducing

[107] MEE. (2015). Guiding opinions on strengthening the construction of enterprise environmental credit system (NDRC [2015] No. 161) (关于加强企业环境信用体系建设的指导意见(环发[2015]161 号)).

[108] MEE. (2019). Regulatory Measures for Construction Project Environmental Impact Report (table) Preparation (MEE No.9) (建设项目环境影响报告书（表）编制监督管理办法（生态环境部令 第 9 号）).

[109] MEE. (2019). The announcement of publishing the Regulatory Measures for Construction Project Environmental Impact Report (table) Preparation and its supporting documents (关于发布《建设项目环境影响报告书（表）编制监督管理办法》配套文件的公告).

[110] Qie Jianrong. (2019). MEE: The first national unified credit management system in the field of ecological environment was launched (生态环境部：生态环境领域首个全国统一信用管理系统启用). Available at: http://www.legaldaily.com.cn/locality/content/2019-11/05/content_8038545.htm

the requirement of third-party review, replacing it with a swift automatic system or giving priority to the issuance of climate impact financial instruments;

- To explore how to establish a future proof evaluation method and index system for climate-friendly financial institutions that are conducive to climate investment and finance;
- To discuss the demands of financial institutions for the evaluation and identification of climate-friendly financial institutions and enterprises, establish a blacklist or brownlist of enterprises and financial institutions for climate evaluation, and formulate relevant disciplinary measures;
- As the quality of climate information disclosure directly affects the credibility and international influence of China's climate change work, the feasibility of including the company's climate assessment level as the primary assessment indicator in the credit information system in the future is explored.

3.3.3 Information disclosure standards

The disclosure of environmental information by financial institutions not only improves the transparency of operation and management but also helps financial regulatory authorities to form an overall judgment on climate-related risks in the financial industry. It is also conducive to forcing entities to disclose environmental information, promoting the effective identification of high-quality green enterprises in the capital market, allocating funds to green industries in a targeted manner, and reducing investment in polluting and high-carbon emission assets.

International financial institutions generally disclosing information refer to the Greenhouse Gas Protocol[111], in which it defines the three scopes - GHGs produced or

[111] Greenhouse Gas Protocol. (2011). Calculation Tools FAQ. GHG Protocol. Available: https://ghgprotocol.org/calculationg-tools-faq

controlled directly by organisations (Scope 1), GHGs produced from energy use (Scope 2), while in addition to Scope 1 and 2, GHGs produced or controlled indirectly are defined as Scope 3.

Based on the thinking of the Greenhouse Gas Protocol, the United Nations TCFD released the Recommendations of the Task Force on Climate-related Financial Disclosures [112], which disclosed environmental information from four aspects: governance, strategy, risk management, and indicators and objectives. The report identifies potential climate-related risks and opportunities for investors, lenders, insurance companies and other stakeholders; reveals the actual and potential financial effects of climate factors on financial institutions' income, expenditure, assets and liabilities, as well as the capital, investment and financing; recommends appropriate assessment and disclosure of information; and also proposes an assessment framework for climate-related risks and opportunities, and recommends information disclosure.

In December 2017, the China-UK green finance working group piloted moves for financial institutions – such as ICBC and HSBC - to carry out the environmental information disclosure of the two countries. A total of 10 Chinese and British financial institutions joined the pilot work[113]and implemented the Climate-Related Financial Disclosure Recommendation Report and the Guidance on Building a Green Financial System into practice. **At present, the primary defect of the green and climate information disclosure standards system is the lack of disclosure of additionality, which is considered as an essential factor to evaluate the additional climate benefits of green finance** [114] [115]. If this misleads the allocation of some

[112] TCFD. (2017). Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures . TCFD. Available at: https://www.fsb-tcfd.org/publications/final-recommendations-report/

[113] Xinhua Finance. (2017). Ten financial institutions in China and UK launched the environmental information disclosure pilot (中英十家金融机构启动环境信息披露试点). Available at: http://greenfinance.xinhua08.com/a/20171216/1741035.shtml

[114] Michaelowa A, Hermwille L, Obergassel W, et al. (2019). Additionality revisited: guarding the integrity of market mechanisms under the Paris Agreement. Climate Policy 19 (10), 1211-1224.

[115] IPE. (2020). Viewpoint: Investing in green doesn't equal greening the world. Available at: https://www.ipe.com/viewpoint-investing-in-green-doesnt-equal-greening-the-world/10043518.article

climate-friendly and concessional funds and the use of climate policies, resources will be wasted.

Based on the above research, the research team proposes to explore the inclusion of environmental and climate change audit in the regular financial audit of enterprises, as well as the disclosure of carbon emission and climate-related environmental impact indicators when enterprises publish their production and operation information. Some industries already have widely used ESG disclosure guidelines, such as Gresb[116], which is used by more than 1,000 real estate companies, with GHGs and climate adaptation risks as indicators. China has issued several regulations guiding domestic enterprises carbon information disclosure, such as the Guidance of the Central Enterprises to Fulfill Social Responsibility, Shanghai Stock Exchange Listed Company Environmental Information Disclosure Guidelines, and the Shenzhen Stock Exchange Listed Company Social Responsibility Guidelines. Meanwhile, Hong Kong has forced the effects of climate change information disclosure as part of the ESG disclosure[117]. However, the development of carbon emission information disclosure standards still needs to explore the operability to ensure that enterprises can truly and fully disclose the climate benefits and environmental benefits. The data of climate investment and finance information disclosure should be timely, accurate and complete, and maintain the same statistical calibre and be traceable.

The project team recommends exploring, with potential users of the standards, how to facilitate an independent audit of a company's carbon emissions and climate-related environmental indicators. In the process of economic and financial audit of enterprises, independent audit institutions can include a carbon audit to quantitatively measure the climate-

[116] GRESB. (2020). The GRESB Real Estate Assessment. GRESB. Available at: https://gresb.com/gresb-real-estate-assessment/

[117] Goncalves P. (2020). Hong Kong tightens ESG disclosure rules to attract investors. International Investment. Available at: https://www.internationalinvestment.net/news/4012355/hong-kong-tightens-esg-disclosure-rules-attract-investors

related indicators of an enterprises' carbon emissions. The carbon audit conducted by an authoritative, independent audit institution can provide data support and a basis for climate investment and financing at the enterprise level, as well as the responsibility of enterprises and governments to examine the actual situation of carbon emission and environmental pollution. It is a move that could lead to more independent supervision and evaluation of carbon emission management activities. In the process of building the standard audit system, the contents that need to be further clarified include audit scope, carbon emission accounting method, audit disclosure information and standard guidelines. In the construction of standards, it is necessary to study whether the supervision department can collect and calculate data at the enterprise level, and build systems for data collection, monitoring and outlier recognition.

Based on the practical experience of relevant institutions, the research team suggests that under the guidance of the climate department, China's climate information disclosure system should be included in the sub-standards of China's green financial information disclosure standards, as part of China's green financial standards system that is under construction. The research team hopes to explore the following factors through this consultation:

- How to establish a standard form for climate risk disclosure, including some indicators that must be disclosed;
- What strategies should be adopted to require listed companies and owners of substantial assets to disclose their assets' climate risks in a timely manner, including physical risks and transformation risks, and conduct stress tests;
- How to combine information disclosure with the statistical standards of climate investment and finance and other green financial information disclosure standards to normatively disclose the climate benefits and risks of climate-friendly assets;

- Whether to encourage a third-party to assess the quality of information disclosure related to climate investment and finance;
- How to punish wrongful disclosure of information, such as climate benefits and other information affecting the records of the credit investigation system and other routine information disclosure;
- Study the application of advanced technologies such as big data to improve the efficiency in auditing;
- Explore how to step up mandatory climate information disclosure requirements and levels, taking full account of the cost of information disclosure; How to promote enterprises that are supported by climate investment and finance policies, or concessional finance, to disclose whether their climate-friendly investment is additional.

3.3.4 Statistical standards

The standard statistical system is the primary system of green finance, and it is the support and guarantee for standardizing the development of green finance and implementing the incentive support policies. Statistical calibre, evaluation and certification system, and accounting methods are essential components of the statistical standards system.

In China, the green credit statistics were mainly based on the unique statistical system for green loans of the PBOC and the green credit statistics system of the CBIRC in 2018. Green industry projects mainly refer to the Catalogue of Green Bond Support Projects compiled by the Green Finance Committee of the Chinese Institute of Finance and The Guidelines on Green Bond Issuance[118] issued by the NDRC. In February 2019, the NDRC and seven other ministries

[118] Zhang M. (2019). Analysis on the standard system of green finance statistics (绿色金融统计标准体系探析). China Post. 410 (03), 16-17.

jointly issued the Green Industry Guidance Catalogue (2019 Edition)[119], covering energy conservation and environmental protection, clean production, clean energy, green ecological environment, infrastructure upgrades and green services. It covered these six major classifications, refined 30 second-level categories and 211 third-level classifications, and clearly defined green industry boundaries.

Credit rating agencies such as China Credit, China Ratings and Golden Credit Rating had different evaluation frameworks for green bonds and evaluation criteria for green projects, but in 2017 the PBOC and the CSRC jointly issued the Guidelines on Evaluation and Certification of Green Bonds (Interim), which unified and improved the certification system of green bonds.

For climate investment and finance statistics, the basic work is how to quantify the accounting or prediction of GHGs emissions as there have been numerous attempts by various international and national agencies to develop and regulate the accounting of GHG emissions. At the national level, the IPCC National Greenhouse Gas Inventory Guidelines provides the latest methods and rules for all countries in the world to build a nationwide GHG inventory and emission reduction performance. The latest 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventory[120] divided GHGs into the four categories of "energy", "industrial processes and products", "agricultural, forestry and land use" and "waste" and presented corresponding related categories, subordinate accounting methods, and emission factors of different industries and established the relevant accounting system of GHGs. Thirteen policy financial institutions, including the World Bank, the ADB, the European Bank for Reconstruction and Development, and the Inter-American Development Bank, have worked together to develop a framework for international financial institutions to account for

[119] NDRC. (2019). Notice on the issuance of the Green Industry Guidance Catalogue (2019 Edition) (NDRC〔2019〕No. 293) .

[120] IPCC. (2019). 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. IPCC.

GHG emissions from investment and financing projects[121]. More details on climate benefit quantification methods will be discussed in the following section, "climate benefit measurement methods and reporting guidelines". The research team also carried out a preliminary sorting of the climate attributes of the "green industry catalogue", with the aim of establishing a basis for the statistical standards of climate investment and finance.

To meet the needs of developing China's statistical methods for climate investment and finance, the research team suggests that under the guidance of the DCC, the statistical methods should be incorporated as a sub-standard into China's green finance standards system. The research team will consult potential standard users about the following suggestions on the statistical methods of climate investment and finance:

- Give priority to the establishment of assessment methods for climate benefit standards to support the establishment of statistical methods or standards for climate investment and finance;
- Identify several principles for the construction of statistical standards, which are recommended to be taken into consideration: applicability, completeness, consistency, accuracy, technicality, and foresight[122];
- Fully solicit suggestions from relevant government departments of green finance statistics during the construction of statistical standards, especially the Department of Statistics of the PBOC;
- Understand the in-depth nature of, and compare, various current climate benefit assessment methods, disclosure differences of various statistical standards, and

[121] World Bank. (2020). Documents & Reports. IFI approach to GHG accounting for renewable energy projects (English). World Bank. Available at:http://documents.worldbank.org/curated/en/758831468197412195/IFI-approach-to-GHG-accounting-for-renewable-energy-projects.

[122] Five principles of GHG Protocol: relevance, completeness, consistency, transparency, accuracy.

explore intelligent conversion methods for establishing different standards or calculation methods;

- How to build an assessment system for climate benefits, including carbon emissions and climate adaptation levels;
- Whether it counts both the absolute emission reduction and the relative emission reduction of each investment and financing item; and whether the certified emission reduction calculation method of the clean development mechanism (CDM) can be used for reference;
- How to distinguish projects with and without climate additionality;
- Study which climate-friendly projects or enterprises are short of funds and need policy subsidies, while which climate-friendly projects or enterprises are not short of funds but are supported by policy subsidies;
- On climate finance statistics, how to establish statistical indicators according to the sources and uses of funds, including public sector or commercial sector, domestic or international sources, and whether they are used by grants or loans or investments;
- Explore the definition of "climate-friendly" and how it can meet domestic development needs, and whether it is in line with international standards;
- Whether to make separate statistics on high climate risk assets to provide a reference for investors;
- Whether "climate-friendly" statistics are separately included in the statistics of green financial products and services;
- Whether it is necessary to establish a unified climate benefit information database, which should be constantly updated and corrected.

3.3.5 Risk management standards

Article 8 of the Paris Agreement clearly states the importance of reducing the negative impacts of climate change and proposes the establishment of a sound risk assessment and management system, as well as the application of risk insurance mechanisms[123]. The IPCC AR4 has highlighted risk management as a significant research area for tackling climate change and identified "key vulnerabilities"[124] that need to be addressed, and in particular, addressed by policymakers.

According to the World Bank[125], 26 million people globally become poor each year because of natural disasters. Natural disasters cause an average of USD 300 billion annually in direct damage and have an economic impact of USD 520 billion. Policy formulation and legalisation are considered an important means of addressing medium - and long-term climate risks[126]. Climate change is forecast to be one of the main causes of natural disasters in the next half-century and is set to cause substantial potential losses to China and the global society and economy as a whole. The variety of risks, and the frequency, extent and impact of disasters[127], may further increase the exposure to catastrophe. The study of climate risk levels under different temperature rise scenarios is the basis for promoting climate risk management. Climate risk is also an important factor leading to poverty or a return to poverty. The evidence observed by the IPCC [128] shows that climate change is further aggravating the living environment of the existing poor.

[123] United Nations Framework Convention on Climate Change (UNFCCC). (2015). Paris Agreement . Available at:http://www.tanjiaoyi.com/apphtml/pdf/PARISAGREEMENT201512120830.pdf

[124] Intergovernmental Panel on Climate Change (IPCC). (2007). IPCC Fourth Assessment Report. Climate change 2007: Working Group II: Impacts, Adaptation and vulnerability. Cambridge: Cambridge University Press.

[125] World Bank. (2016). Innovative Insurance to Manage Climate Risks. World Bank.

[126] Li Y, Tian S. (2018). Legislation on climate change risk regulation in the context of uncertainty and complexity (不确定性与复杂性背景下气候变化风险规制立法. 吉林大学社会科学学报). Jilin University Journal Social Science. 58 (2):42-50.

[127] IPCC. (2012). Managing the risks of extreme events and disasters to Advance climate change adaptation. IPCC.

[128] IPCC. (2014). IPCC Fifth Assessment Report. Climate Change 2014: Impacts, Adaptation, and Vulnerability. Cambridge: Cambridge University Press.

According to the definition of the Bank of England[129], financial risks caused by climate change include two types: physical risks and transition risks (**Figure 3-4**). Physical risks are mainly caused by climate and weather, such as droughts, floods and storms, and rising sea levels. This includes both the direct effects of these events, such as property losses and the indirect effects of subsequent events, such as disruptions to global supply chains. Global and regional climate change can also cause inefficient operations in agriculture, labour and real assets. Transition risk refers to the financial risk caused by the transition of a low-carbon economy. Changes in climate policy, technology and market sentiment will cause a revaluation of most assets, and the costs and opportunities of change will become more visible. Although the frequency of revaluations is uncertain, it is vital for financial stability and the safety and soundness of financial institutions. In this context, the financial industry needs to transform the scale of assets.

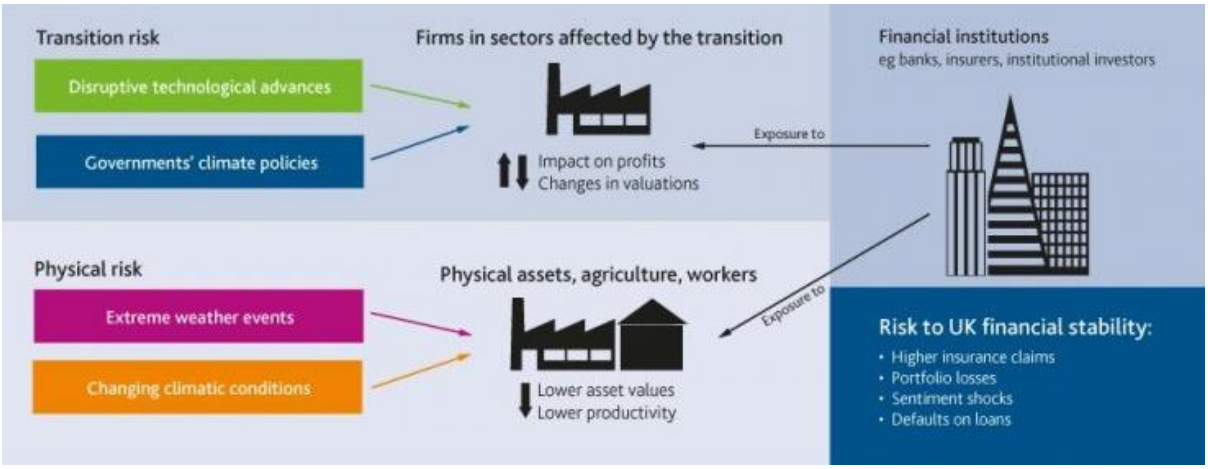


Figure 3-4 Climate change is a significant source of financial risk[130]

The physical risks of climate change can be seen in two different ways: gradual changes in average conditions (such as average temperature, average precipitation, and water resources);

[129] Bank of England. (2020). Climate change: what are the risks to financial stability?. Bank of England. Available at: https://www.bankofengland.co.uk/knowledgebank/climate-change-what-are-the-risks-to-financial-stability

[130] Ditto

and an emergency or extreme weather (extreme precipitation, drought, widespread melting of glaciers, heat waves and cold waves).

Physical factors can cause significant damage to property. If an insurance company already has coverage, that will directly affect the insurance company through high claims. If there is no insurance coverage, households or businesses will bear the losses, affecting the valuation of their assets and damaging the value of the investments held by financial institutions. These create even greater systemic risks beyond the corporate level, such as economic volatility, lower productivity and increased risk of sovereign default. Over the past few decades, both insured losses and overall direct losses from natural disasters have risen from an annual average of USD 10 billion in the 1980s to a yearly average of USD 45 billion more recently. Aggregate losses have tripled over the past three decades, to four times the insured losses, creating a gap between economic damages and insurance losses that will continue to widen. These losses were mainly due to exposure (the value of assets in high-risk areas). A cumulative 20 cm rise in sea levels in New York's Battery area since 1950 increased the damage caused by Hurricane Sandy by 30%[131], according to estimates by Lloyd's of London.

The identification and quantitative assessment of the risks brought by climate change are the basis of climate risk management. At present, a research method for climate risk has been developed domestically and internationally. It reveals vulnerability through experiments, models and comparative means; identifies the impact degree of climate change through statistical and numerical analysis; identifies and evaluates future risks through numerical simulation; and analyses the uncertainty in climate risk assessment through statistical

[131] Lloyd’s of London. (2014). Catastrophe Modelling and Climate Change. Lloyd’s of London.

methods[132]. In contrast, disaster risk assessment has been relatively improved, and climate risk assessment can be expanded on the disaster assessment system[133].

The 2014 report[134] of the Global Commission on the Economy and Climate says the next 15 years are critical, given the structural transformation the global economy is going through. By 2030, the world is expected to need up to USD 90 trillion of investment in infrastructure for urban construction, land use and energy systems. According to the IEA's 2016 world energy outlook, an additional USD 26 trillion will be needed in new energy and energy efficiency alone between 2015 and 2040 to achieve the 2℃ target, compared with the current policy scenario.

As the Bank of England Prudential Regulatory Authority[135] points out, the low-carbon transition will affect not only traditional fossil energy assets but also infrastructure, heavy industry and transport that rely on fossil energy or are energy-intensive. Accelerating the realisation of "net zero emissions" in the future will have a profound impact on all sectors of the economy. However, the risk of a threat to financial stability would be significantly reduced if financial institutions began to transform early and move towards a future trend. So, the central banks need to help financial markets recognise the required shift towards the 2℃ target.

As well as these two types of risk, the Bank of England's study of the insurance industry also takes into account the third type of risk and includes "liability risk"[136] as part of the financial risk of climate change. Liability risk mainly refers to the uncertainty caused by one party claiming loss or injury to the responsible party due to the impact of climate change. This

[132] Gao J, Jiao K, Wu S, et al. (2017). The theoretical paradigm and method system of climate change impact and risk research (气候变化影响与风险研究的理论范式和方法体系). Acta Oecologica. 37(7): 2169-2178

[133] Peng P, Zhang R, Hong Mei, et al. (2015). Research progress of climate change impact and risk assessment methods (气候变化影响与风险评估方法的研究进展). Transactions of Atmospheric Sciences. 38(2): 155-164

[134] The Global Commission on the Economy and Climate. (2014). Better Growth, Better Climate: The New Climate Economy Report. The Global Commission on the Economy and Climate.

[135] Bank of England Prudential Regulation Authority. (2018). Transition in thinking: The impact of climate change on the UK banking sector. Bank of England. Available at: https://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/report/transition-in-thinking-the-impact-of-climate-change-on-the-uk-banking-sector.pdf

[136] Bank of England. (2020). What are the liability risks?[E/OL]. Bank of England. Available at: https://www.bankofengland.co.uk/knowledgebank/climate-change-what-are-the-risks-to-financial-stability

risk is primarily targeted at the insurance industry, especially considering that these risks can be transferred through liability protection, for example, board supervisors and senior managers liability insurance and professional liability insurance. The Bank of England is still assessing the impact of liability risk, and particularly the secondary impact on the overall policy risk framework.

In addition to central banks, the non-profit Natural Capital Coalition[137] has proposed a natural capital assessment approach to assessing the environment, climate change and the risks of natural resource use by financial institutions. This assessment method establishes some specific cases, such as the natural capital impact assessment of marine food in the portfolio of investors conducted by Berquins Bank in Paris[138]. However, this model of climate risk management based on natural capital relies on a lot of subjectivity and qualitative judgment factors. Here, climate risk quantitative management capacity is not a strong element.

The project team proposes to explore the inclusion of China's climate finance risks as an important part of China's green risk standards, and further investigate the requirements of this standard through this consulting report to discuss the following points:

- Discuss how to accurately define various risk factors caused by climate change;
- How to develop climate risk standards from different dimensions such as financial system, industry, city and enterprise;
- How to encourage governments and industry associations to quantify losses from medium - and long-term climate risks as early as possible;

[137] Natural Capital Coalition, Natural Capital Finance Alliance. (2018). Connecting Finance and Natural Capital: A Supplement to the natural capital protocol. Natural Capital Coalition. Available at: https://naturalcapitalcoalition.org/wp-content/uploads/2018/05/Connecting-Finance-and-Natural-Capital_Supplement-to-the-Natural-Capital-Protocol-1.pdf

[138] BNP Paribas Asset Management, Natural Capital Coalition. (2019). Finance Sector Supplement to the Natural Capital Protocol: Case Study for BNP Paribas Asset Management. Natural Capital Coalition. Available at: https://naturalcapitalcoalition.org/finance-sector-supplement-to-the-natural-capital-protocol-bnp-paribas-asset-management-seafood-case-study/

- Explore whether to promote financial system reform to reflect potential additional losses from climate risks;
- Study how to promote the actuarial department of insurance companies and financial institution research departments to carry out research on the standardisation of climate risk calculation.

3.4 Proposed separate standards

Climate investment and finance standards, especially climate finance standards, are an important part of the green financial system. However, some of the domestic climate investment and finance standards proposed by the research team are not yet within the scope of China's green finance standards system. Therefore, it is necessary to add new standards for China's climate investment and finance work, including climate benefit measurement methods and reporting guidelines; directory of guidance for NDCs projects; identification and classification of climate finance; carbon finance and derivatives standards; and corporate climate risk management.

3.4.1 Work plan for the construction of the climate investment and finance standards system

The construction of climate investment and finance standards is long-term work and involves many fields and different government departments. To carry out the standards work more systematically, we propose to formulate the work plan for the standards system. The Chinese government has rich experience in building a standards system. For example, MEE is committed to building a standards system for ecological and environmental protection[139]. In 2017, the NDRC and the National Standards Commission issued a plan for building a standards

[139] MEE. (2019). MEE regular press conference in July 2019. MEE. Available at: http://www.mee.gov.cn/xxgk2018/xxgk/xxgk15/201907/t20190727_712530.html

system for energy conservation[140]. Usually, the work plan of the standards system needs to review the current situation of the relevant standards and clarify the guiding ideology, basic principles and construction objectives. Secondly, the content and working direction of the standards system should be described. Finally, the management mechanism and guarantee mechanism should be clarified.

In 2015, the State Council issued the Reform Plan for Deepening Standardisation Work[141], which put forward the principles and suggestions for promoting the development of a high-quality standards system. It proposed the principles of streamlines administration, delegates power, improve regulations, adheres to international standards, and adapts to national conditions. Tian Shihong, Director of the Standardisation Administration of China, said the standardisation reform needs to push the government to "slim down" its standards and release the vitality of the development of market standards[142]. On the other hand, the construction of climate investment and finance standards needs to learn from the experience of local green finance pilot projects[143] [144].

We recommend that **the primary task of the work programme for standards system building should be to identify and classify climate-friendly projects.** From the perspective of climate attribute classification, there is no uniform international classification of which investments, financing products, or projects belong to in terms of climate mitigation or climate

[140] NDRC, Standardisation administration of China. (2017). Energy Conservation Standard System Construction Plan. Available at:http://www.gov.cn/xinwen/2017-01/19/5161268/files/79aa952f94a147c59e387c25e30e0c21.pdf

[141] State Council. (2015). The circular of the State Council on printing and distributing the plan for deepening the reform of standardisation work. State Council〔2015〕No.13. Available at: http://www.gov.cn/zhengce/content/2015-03/26/content_9557.htm

[142] State Council. (2017). The standardisation reform progressed smoothly and achieved positive results (标准化改革进展顺利，取得了积极成效). Available at: www.gov.cn/xinwen/2017-09/08/content_5223671.htm

[143] Pan D, Xv X. (2019). Green finance reform and innovation pilot zone: green finance promotes regional trans-formation (绿色金融改革创新试验区：绿色金融助推区域转型). Available at: http://ideacarbon.org/news_free/48568/

[144] Chaozhou Daily. (2018). Huzhou formulated the first national green finance local standard (湖州制定全国首批绿色金融地方标准). Available at: http://www.greenfinance.xinhua08.com/a/20180629/1767039.shtml

adaptation. The EU launched its Sustainable Development Classification Scheme[145] in March 2020, which identifies industries with the potential to reduce emissions and adapt to climate change but does not define specific types of activities. For example, the EU's classification scheme for the cement and steel manufacturing industry has no clear definition of what types of emission reduction accord with the requirement of sustainable development - such as investment in efficiency improvement of auxiliary coal boilers in a steel plant- and whether emissions other than conventional coal-fired auxiliary power plant belong to the sustainable development element of investment in the EU.

In contrast, the NDRC's Green Industry Guidance Directory[146] is more finely detailed. However, since the target set by the catalogue is not primarily designed to cope with climate change, many categories of the catalogue cannot identify the climate benefits for industry, so it needs to be further sub-divided according to the actual situation. For example, with the manufacturing of environmental monitoring equipment, only the manufacturing of greenhouse gas monitoring equipment has indirect climate mitigation benefits. **At the end of the report, Appendix 2 contains the research team's preliminary assessment of the potential climate benefits of various categories of the Green Industry Guidance Catalogue, based on the emissions of various industries.**

The research team suggests that the work plan for China's system of climate investment and finance standards should be jointly formulated by the MEE, the PBOC and other financial authorities and the standardisation administration of China. The research team will explore the following questions in this consultation report:

[145] EU Technical Expert Group on Sustainable Finance. (2020). Technical Report. Available at: https://ec.europa.eu/info/sites/info/files/business_economy_euro/banking_and_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy_en.pdf

[146] NDRC. (2019). Notice on issuance of the Green Industry Guidance Catalogue (2019 Edition) (关于印发《绿色产业指导目录(2019 年版)》的通知(发改环资〔2019〕293 号).

- How to identify climate attributable investment and financing activities of various industries, including linking with existing domestic and international standards, catalogues and classifications;
- How to define the rights and responsibilities of various sub-standards to ensure that goals can be achieved and tasks can be implemented;
- How to ensure the full study of existing standards and avoid conflict with current standards;
- How to mobilise and organise relevant industries and experts to actively participate in the project, so that every little contribution makes a big difference. For example, whether to study and introduce the "blockchain model" to encourage experts and enterprises to contribute to the construction of the standards;
- How to position sub-standards of climate investment and finance that can be covered by green finance and new standards of climate investment and finance that are not covered by green finance;
- How to clarify the relationship between climate investment and climate finance;
- Study the connection between climate investment and finance standards and different modes of climate investment and finance - such as the PPP (Public-private partnership) model - financial subsidy mode and preferential price;
- How to connect with the current national standardisation reform and build a climate investment and finance standards system by actively utilising various innovative mechanisms;
- How to continuously master policy and market demand, to guide standards construction;

- How to consider building standards in stages and at different levels, including exploring local pilot climate investment and finance standards;
- How to provide personnel and funds for the construction of climate investment and finance standards;
- Whether it should be connected with relevant international standards to ensure that the standards are forward-looking.

3.4.2 Climate benefit measurement methods and reporting guidelines

The establishment of an appropriate and practical climate benefit measurement method is the basis for the construction of high-quality climate investment and financing standards. Most of the green finance standards do not provide a detailed assessment of climate benefits, but only identify green or non-green by project type or field. Climate benefits include climate mitigation benefits (i.e. emission reduction benefits) and climate adaptation benefits (i.e. the improvement of the level of climate adaptation). For the assessment of GHG emissions related to climate mitigation benefits, China has built a rock-solid foundation from the clean development mechanism (CDM) and the pilot construction of China's carbon market in the past seven years. For example, the NDRC issued the Guideline on the Accounting and Reporting Methods of Enterprises' Greenhouse Gas Emissions in Ten Sectors (Trial) [147] in 2013. While there has been an assessment of the benefits of climate adaptation investment in various fields, including vulnerability analysis, and there are international standards for climate adaptation[148], there is **currently no unified international method for quantifying the level of climate**

[147] NDRC. (2013). Notice on releasing the Guideline on the Accounting and Reporting Methods of Enterprises' Greenhouse Gas Emissions in Ten Sectors (Trial) (NDRC (2013) No. 2526) (关于印发首批 10 个行业企业温室气体排放核算方法与报告指南（试行）的通知 (发改办气候〔2013〕2526 号)). Available at: www.gov.cn/zwgk/2013-11/04/content_2520743.htm

[148] ISO 14090:2019. (2019). Adaptation to climate change — Principles, requirements, and guidelines. Available at: https://www.iso.org/standard/68507.html

adaptation. A lot of research work is still needed to support the construction of the standard.

For carbon emission measurement, the commonly used methods include measurement method, material balance method, and emission coefficient method. The Scope of carbon emission measurement shall consist of direct emissions within Scope 1, energy-related indirect emissions within Scope 2, and consumption-related indirect emissions within Scope 3. However, Scope 3 emissions are challenging to measure continuously and are not within the control of emission units, or may take a longer time to be included as a standard for identifying climate benefits. In order to more accurately judge the carbon emissions generated by investment and financing, it is necessary to gradually improve the measurement method of Scope 3 and build a database related to consumption emissions. Double counting[149] should be avoided in the calculation of climate benefits, such as the inclusion of emission reduction in the investment and financing products of two upstream and downstream enterprises[150]. Avoiding double counting is seen as key to the success of policy tools such as carbon markets.

At an enterprise level, GHG Accounting System: Enterprise Accounting and Reporting Standards[151] sets standards for enterprises to report their GHG emissions, helps them to identify their GHG emissions, calculate, report and verify their GHG emissions and set reasonable emission reduction targets. The International Organisation for Standardisation in 2006 issued the ISO 14064 series of GHG accounting standard ISO 14064-1[152]. It sets out the requirements of design, development, management and reporting GHG at the organisation or enterprise level, including GHG emissions boundary, quantifying GHG emissions and improving GHG

[149] WBCSD, WRI. (2012). The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard - Revised Edition. GHG Protocol. Available at: https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf

[150] Schneider L, Duan M, Stavins R, et al. (2019). Double counting and the Paris Agreement rulebook. Science. 366(6462):180-183.

[151] Greenhouse Gas Protocol. (2011). GHG accounting system: enterprises accounting and reporting standards (revised) . GHG Protocol. Available at: https://ghgprotocol.org/sites/default/files/standards/Chinese_small.pdf

[152] ISO 14064-1:2018. (2018). Greenhouse gases - Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals.

emission management. At the project level, the Greenhouse Gas Accounting System: Project Quantification Methods[153] and ISO 14064-2[154] Specification for Quantification, Monitoring and Reporting of Project Greenhouse Gas Emissions and Reductions are mainly adopted internationally.

International financial markets are concerned about how to reduce investment in fossil fuels by financial institutions and increase investment in climate-efficient assets. GHG Protocol has established guidelines for financial institutions on climate impact assessment[155], providing financial institutions with calculation methods for GHGs at enterprise, project and portfolio levels; establishing quantitative identification indicators (such as the amount of investors' green energy projects); and creating industry reference indicators[156].

For the quantification of financial institutions' own GHGs, ORSE, a French institution, took the lead in formulating the report Understanding the Quantification of GHG Emissions in the Financial Sector[157]. It recommends that financial institutions classify the priority types of GHG emissions, including direct and indirect emissions, into priority and secondary emissions. At the same time, it is suggested that it is important to determine the organisational and operational boundaries in the process of GHG statistics. Although this report is the first to show how financial institutions systematically account for their GHG emissions, we believe that this emission classification method is not necessarily scientific and does not have a strong ability to connect with the widely-used Scope 1, 2 and 3.

[153] Greenhouse Gas Protocol. (2005). Greenhouse Gas Accounting System: Project Quantification Methods. GHG Protocol.

[154] ISO 14064-2:2019. (2019). Greenhouse gases – Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements.

[155] Greenhouse Gas Protocol. (2020). Portfolio Carbon Initiative. GHG Protocol. Available at: https://ghgprotocol.org/portfolio-carbon-initiative

[156] Weber C, Thoma J, Dupre S. (2018). Exploring Metrics to Measure the Climate Progress of Banks. GHG Protocol. Available at: https://ghgprotocol.org/sites/default/files/standards/Exploring%20Metrics%20to%20Measure%20the%20Climate%20Progress%20of%20Banks.pdf

[157] ORSE, ADEME, ABC, Bilans. (2016). Understanding the issues around quantifying GHG emissions in the financial sector (Financial Sector: Sectoral Guide – 2014). ORSE. Available at: https://www.orse.org/fichier/2646

The GHG Accounting System: Enterprise Accounting and Reporting Standards, which is widely used at present, has some limitations. This standard briefly introduces the additionality of certified emission reduction (CER) [158] but lacks the evaluation method for the additionality of investment and financing of enterprises or financial institutions. On the other hand, in the calculation of Scope 3, the standard only describes the Secondary Effect of emissions (Secondary Effect), and it believes the effect is insignificant[159] and is lacking follow-up of consequential life- cycle assessment. Climate investment and financing activities may also have a significant impact on the subsequent life-cycle of supply and demand in commodity markets.

As discussed in the previous section, how to evaluate the additional climate benefits is an essential cornerstone of the quantification of climate investment and finance. Currently, green finance generally does not carry out additionality assessment, and it is not clear whether various green labels and certifications can promote the additional green benefits brought by investment instruments (such as green bonds, green credits and green funds). The Green Bond Standard[160] proposed by the EU Technical Expert Group on Sustainable Finance in 2019 and the Sustainable Finance Classification Report published in 2020 both mentioned the lack of additionality[161] of the standards but did not propose countermeasures. **The French research institute on climate finance, I4CE, explicitly suggests that the government must ensure that climate investment and finance projects supported by policies have a minimum of additionality to avoid waste of public resources. Meanwhile, it also suggests that**

[158] World Business Council for Sustainable Development (WBCSD), WRI. (2012). Chapter 9: Reporting GHG Emission. The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard - Revised Edition. GHG Protocol. Available at: https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf

[159] WBCSD, WRI. (2012). Chapter 9: Reporting GHG Emission. The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard - Revised Edition. GHG Protocol. Available at: https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf

[160] EU Technical Expert Group on Sustainable Finance. (2019). Report on EU Green Bond Standard: Financing A Sustainable European Economy. TEG Report, Proposal for an EU Green Bond Standard.

[161] EU Technical Expert Group on Sustainable Finance. (2020). Technical Report. Available at: https://ec.europa.eu/info/sites/info/files/business_economy_euro/banking_and_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy_en.pdf

additionality assessment can be carried out on an average basis rather than considering individual projects[162].

In 2012, the MDBs endorsed the Principles for Supporting Sustainable Private Sector Operations[163], which aim to guide the MDBs' engagement with the private sector to achieve development goals consistent with its mandate. Among them, additionality is regarded as the first and most important principle. Additionality is defined as the support of the MDBs to the private sector and should be given beyond its existing scope if it is not available in the market, and should also not crowd out the private sector.

In the process of human response to climate change, the CDM project additionality assessment tool[164] is currently the only method to systematically assess the additionality of investment on a global scale, and is a method is widely used in the carbon market flexibility mechanism. Therefore, major countries and regions have already had an excellent foundation in the methodology of additionality assessment. In practice, however, the additionality of the CDM is often challenging to measure accurately, and the reality of the CDM's evaluation system and the price level for certifying emissions reductions does not necessarily bring real additional climate mitigation benefits[165]. **In order to make better use of climate-friendly and concessional funds and policies, the real additionality assessment is the core element of the standard construction of climate investment and financing.** The research team will carry out further research into this in the next step.

[162] Shishlov I, Morel R, Cochran I. (2016). Beyond Transparency: Unlocking the Full Potential of Green Bonds. Available at: https://www.cbd.int/financial/greenbonds/i4ce-greenbond2016.pdf

[163] Multilateral Development Banks. (2012). Multilateral Development Bank Principles to Support Sustainable Private Sector Operations. Available at: https://www.ebrd.com/downloads/news/mdb.pdf

[164] UNFCCC. (2012). Tool for the demonstration and assessment of additionality. Available at: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf/history_view

[165] Friends of the Earth. (2008). Trading in fake carbon credits: Problems with the Clean Development Mechanism. Available at: https://foe.org/2008-10-trading-in-fake-carbon-credits-problems-with-the-cle/

Case study: CDM project additionality assessment tool

According to Methodological Tool: Tool for the Demonstration and Assessment of Additionality (Version 07.0.0) [166], the specific evaluation steps of additionality evaluation include:

Step 0: To demonstrate whether the proposed project activities are unprecedented;

Step 1: Identify alternative project activities in accordance with existing laws and regulations, including 1a: defining alternatives to project activities and 1b: consistency under mandatory laws and regulations;

Step 2: Investment analysis, including 2a: selection of appropriate analysis method, 2b: calculation and comparison of financial indicators, and 2c: sensitivity analysis;

Step 3: Barriers analysis, including 3a: identification of obstacles to the implementation of proposed CDM project activities, and 3b: an indication that identified barriers will not prevent the implementation of at least one alternative (other than the proposed project); and

Step 4: General analysis, including 4a: measures applicable to the proposed CDM project in the measurement definition part above, and 4b: measures not applicable to the proposed CDM project in the measurement definition part above.

Drawing on the experience of MDBs in additionality assessment and CDM additionality assessment, the research team suggests that the process of additionality assessment of climate investment and finance is shown in **Figure 3-5**. Different from CDM additionality assessment, the additionality assessment of climate investment and finance focuses on its climate properties. Firstly, the type of activity should be defined as climate-friendly (Step 0). In the further investment analysis, the evaluation of climate investment and financing projects focuses on

[166] UNFCCC. (2012). Methodological Tool: Tool for the Demonstration and Assessment of Additionality (Version 07.0.0) . Available at: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

whether the type of activity is financially feasible without labelling (Step 2), rather than the "financially attractive" appeal of CDM projects. In addition, based on the climate attributes of climate investment and finance, it is also necessary to evaluate whether the emission of activity types is lower than the industry baseline (Step 3). Only the activity types below the baseline are additional. It is important to note that if the activity type of emission is above the baseline, but the principal technology used is cutting-edge technology - that is, in the R&D project category (Step 4) - the activity type is also additional. In addition, drawing lessons from the additionality assessment of CDM projects, it is recommended that the additionality assessment of climate investment and finance be carried out by a fully independent and authoritative body. It is also recommended the need to evaluate the project types in a particular region without evaluating specific projects, such as photovoltaic power generation projects in Guangdong province and energy storage projects in Beijing.

The research team suggests that for China's requirements for climate benefit assessment methods and reporting guidelines, it is necessary to understand the recommendations of standards users and experts on the following issues:

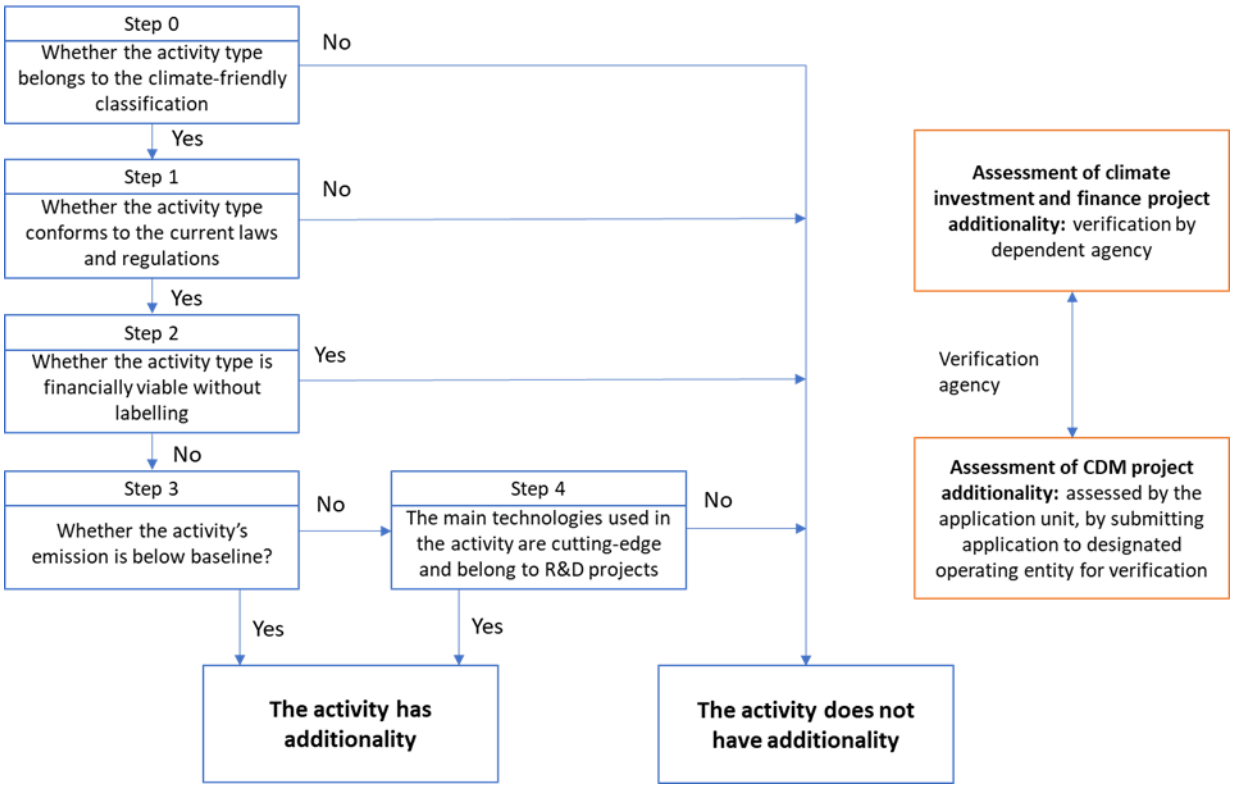


Figure 3-5 Climate investment and finance additionality assessment process

recommendations

- Whether it is necessary to further improve the measurement method of carbon emissions in various industries, especially some projects that are not involved in carbon trading, but will be included in climate financings, such as electric vehicles and energy storage;
- How to gradually build measurement standards for climate adaptation benefits, effectively evaluate the climate adaptation investment benefits of urban and rural infrastructure, and in particular, develop measurement methods to avoid investment and financing projects that generate significant climate vulnerability;
- How to gradually expand the scope of carbon emission measurement and include it in Scope 3 through digital means; how to encourage research institutes and

enterprises to prepare for the construction of a better carbon emission measurement system and database after 2030;

- How to assess the additionality of climate benefits; whether it is recommended that an independent and authoritative third party conduct climate benefit additionality assessments using industry and regional averages to avoid the risk and cost of additionality assessments arising from the data quality of individual projects;
- Clarify the disclosure method of different emission ranges, solve the problem of double accounting of emissions, and avoid the repeated incentive of the same emission reduction.

3.4.3 Directory of guidance for Nationally Determined Contribution projects

China proposed the national strategies to tackle climate change, and submitted the Nationally Determined Contribution (NDC) to the United Nations (UN) in 2015. This contained a commitment to peaking its carbon emissions around 2030 – with an endeavour to make the best efforts to peak earlier - and also cut its carbon dioxide emissions per unit of Gross Domestic Product (GDP) by 60-65% from 2005 levels by 2030, while increasing non-fossil fuel sources in primary energy consumption to about 20% and forest growing stock by 4.5 billion cubic metres[167], based on 2005 levels. At present, a number of non-profit and academic institutions are asking countries to raise the NDC target[168] and quantify it to match the global goals set by the Paris Agreement[169].

[167] Equivalent to 50 to 100 million hectares of new forest.

[168] Grantham Research Institute on Climate Change and the Environment. (2018). Policy brief: Aligning national and international climate targets. Available at: http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2018/10/Aligning-national-and-international-climate-targets-1.pdf

[169] Cohran I. (2019). What does Alignment with the Paris agreement» mean? Institute for Climate Economics. Available at: https://www.i4ce.org/what_alignment_mean/

At present, there is still a lack of unified methodology in China on how to transform the NDC goals into the climate change goals of financial institutions or enterprises and embody them in the investment and financing of financial institutions or enterprises. Entrusted by the Department of Climate Change of the MEE, the Industrial Bank has carried out exploratory research on how banks can promote the peak of carbon emissions around 2030[170], and proposed to construct a carbon intensity index of credit to reflect the contribution of commercial banks to carbon dioxide emission reduction. From the observation of a global dimension, international non-profit institution Science Based Targets is helping enterprises and financial institutions[171] to set up emission reduction targets linking with the Paris Agreement 2 °C goal. So far, 365 companies have adopted the emission reduction targets suggested by Science Based Targets, including 20 Chinese companies (e.g. Lenovo Group, TCC International Holdings Limited).

China will start the operation of a national carbon market this year, but as it is still in the development stage, very tight carbon emission constraints or a very high carbon price will be difficult to achieve in the short term. However, the country has been encouraging the pilot and leading climate-friendly projects. To promote an investment market in climate-efficient advanced projects and to identify policy needs or financing needs for advanced projects, it is necessary to establish a directory of guidance for NDC projects. The research team suggests the screening and construction of the guiding catalogue should be guided by the Department of Climate Change. Research should include carbon emission reduction and climate adaptation projects, as well as liaison with stakeholders to explore project screening process indicators

[170] Fang Q, Qian L, Lu Z. (2020). Industry Bank Research-Green Finance Special Report: Banks and China's "Carbon Peak", Construction of Comprehensive benefit index of Carbon Emission Reduction Credit (兴业研究-绿色金融专题报告：银行与中国“碳达峰”，信贷碳减排综合效益指标的构建). Available at: http://m.hibor.com.cn/wap_detail.aspx?id=d5155dbdbd66d1392a5faa9d4f639b88

[171] Science Based Targets. (2020). Meet the companies already setting their emissions reduction targets in line with climate science. Available at: https://sciencebasedtargets.org/companies-taking-action/

such as climate, technology advancement and demonstration significance, investment and financing mode, and social benefits.

3.4.4 Methods for the identification and classification of climate finance

There is a wide range of sources and uses of funds in climate change, but globally there is currently no unified definition of the use of climate finance. The most systematic identification is based on the UNFCCC reporting mechanism of climate finance support from developed countries to developing countries[172], but the definitions remain inconsistent. The OECD's Rio Markers Climate Handbook[173] contains suggestions for differentiating between different sectors of climate investment and financing. The World Bank International Finance Corporation[174] has also defined and developed a system of indicators for climate-related activities.

The research team expects to discuss the following contents with potential standards users in the consultation process regarding the need to establish the identification and classification method of climate finance in China's climate investment and financing standards:

- Key issues for funding identification and classification, based on review and analysis of domestic and international climate finance identification methods and literature analysis;
- How to distinguish between commercial climate finance and policy climate finance (e.g. concessional finance). The needs of commercial finance to achieve the necessary business rate of return in accordance with market rules, while policy climate finance

[172] Duarte M. (2013). Climate Finance Tracking. African Development Bank Group. African Development Bank Grou. Available at: https://unfccc.int/files/cooperation_support/financial_mechanism/long-term_finance/application/pdf/climate_finance_tracking_unfccc_ltf_aug_2013_online.pdf

[173] OECD. (2016). OECD DAC Rio Markers for Climate: Handbook. OECD. Available at: https://www.oecd.org/dac/environment-development/Revised%20climate%20marker%20handbook_FINAL.pdf

[174] IFC. (2017). IFC's Definitions and Metrics for Climate-Related Activities. IFC. Available at: https://www.ifc.org/wps/wcm/connect/8ebdc507-a9f1-4b00-9468-7b4465806ecd/IFC+Climate+Definitions+v3.1+.pdf?MOD=AJPERES&CVID=lQuLLhw

(including some climate-friendly investors from the business community) can reduce the business rate of return required for climate-friendly projects;

- Explore how many different categories of funds need to be considered, such as whether the funds should be classified according to the way they are used (e.g. grants, loans, equity investments and debt investments);
- How to identify the needs for additionality for climate finance, especially for policy finance, and how to ensure that public sector funding and climate-friendly investor funding can produce real additional benefits for emissions reduction and adaptation.

3.4.5 Carbon finance and derivatives standards

The carbon emission trading market (cap-and-trade system, namely carbon market) is a critical way to internalise the external cost of GHG emissions. An emission control enterprise shall obtain a certain amount of allowance each year, according to the allowance allocation method (such as the grandfathering method or the benchmark method). If the enterprise's emissions exceed the allowance, it shall purchase the allowance from the carbon market in the compliance period after one year. However, if the emission reduction is achieved, the remaining allowance can be sold to the market to generate cash flow to compensate the emission reduction investment. More than 40 countries and regions around the world have set up carbon emission trading markets, including eight pilot provinces and cities in China. Existing empirical studies have shown that carbon markets are conducive to low-carbon technological innovation and encourage enterprises to achieve carbon emission reduction[175].

Carbon finance refers to the financing services conducted by using carbon market allowance, such as carbon allowance mortgage loan, while carbon financial derivatives - such as carbon forward, carbon futures, carbon options, carbon swaps and carbon structured

[175] Guo J, Gu F, Liu Y, et al. (2020). Assessing the impact of ETS trading profit on emission abatements based on firm-level transactions. Nature Communications. 11,2078:1-8. Available at: https://www.nature.com/articles/s41467-020-15996-1.pdf

financial products - are subject to carbon emission rights or certified emission reduction. Carbon financial derivatives can also increase the trading activity and liquidity of the carbon market, and create conditions for financial institutions to participate in the carbon market, develop other derivative products, and provide carbon financial services. However, the application of carbon finance and derivative products needs to be coordinated with a mature and stable carbon market. At present, China's regional carbon market and national carbon market are still in their infancy, so it is necessary - but not urgent - to establish standards for carbon finance and derivative products.

The research team suggests that the following four points should be discussed in the next phase of China's carbon finance and derivative product standards construction demand study:

- Draw on the experience and lessons of international financial institutions in carbon finance and derivatives business and their standardisation needs, as well as the requirements of potential standard users, such as China's domestic carbon emission mortgage financing and carbon long-term business standardisation;
- How to research the risk management of carbon finance and derivative products to understand the demand of enterprises and financial institutions for carbon finance and derivative products;
- Analyse how the development of carbon finance and derivatives drives actual emissions reduction, and study the marginal climate benefits or additionality of developing and trading new derivatives.
- How to develop regulatory approaches for the issuance and trading of carbon finance and derivatives.

- Investigate the feasibility of applying blockchain technology for improving the MRV process, ultimately enhancing the integrity of carbon market related allowance or CCER

3.4.6 Measures for enterprise climate risk management

Section 3 of this chapter discusses the climate finance risk standard of financial institutions, which is a part of the green finance risk and management guarantee standard of China's green finance standards system. As the main body of carbon emissions, enterprises also need to build a governance structure related to climate change, assess the risks and opportunities of climate change, and address medium - and long-term climate risks. Corporate climate risk also includes physical climate risk and climate transition risk.

At present, there are only a few Chinese enterprises carrying out a quantitative analysis of climatic physical risks. However, many enterprises have analysed typhoons, floods, droughts and other disasters in the feasibility study phase of their project, as part of the preparation procedures of the feasibility study report[176]. On the other hand, the indirect effects of physical climate risks are often ignored by enterprises. For example, the lack of water[177] caused by extreme drought may affect the normal production of enterprises that need water as raw material, such as power plants or chemical plants that need fresh water for cooling and steam supply.

The specific manifestation of climate transition risk is the potential loss of enterprises caused by the change of carbon emission policies in the future, such as the increase of carbon market price or carbon tax level, or the international community agreeing on strict product

[176] Li K. (2017). Theoretical methods and applications of project risk analysis and evaluation (analysis and evaluation methods and applications of engineering consulting specialty) (工程项目风险分析评价理论方法及应用 (工程咨询专业分析评价方法及应用丛书)). Beijing: China Electric Power Press.

[177] Kommunalkredit Public Consulting GmbH. (2013). Assessing the impact of climate change on water supply sources and WSS systems in Moldova and inventory possible adaptation measures (Task 1) . Kommunalkredit Public Consulting GmbH. Available at: https://ec.europa.eu/environment/marine/international-cooperation/pdf/Moldova_Task%201_Final_EN_26%20Feb.pdf.pdf

emission standards. China's primary energy is coal, while Europe and the United States are more reliant on natural gas. China's coal-based energy and industrial systems will face significant challenges in global low-carbon transition in the future, as coal often produces more than twice as much emissions per unit of electricity or hydrogen compared to natural gas. It is a common method for enterprises to evaluate their investment decisions at a price higher than the market price, a method known as the internal carbon price of enterprises. According to the Carbon Disclosure Project (CDP)[178], 1,400 companies around the world had adopted an internal carbon price in 2017. For example, the Shell Group, one of the world's largest energy companies, announced in April 2020 that it would achieve the goal of net-zero emissions by 2050[179], becoming the third European oil company to propose a net-zero target after BP and Total. Shell introduced an internal carbon price as early as 1995 and announced an internal carbon price of USD 40 per tonne of carbon dioxide in 2010[180]. Financial institutions are also gradually starting to adopt an internal carbon price, such as the European Investment Bank [181] which adopted an internal carbon price of EUR 30 per tonne for financial evaluation in 2013 and has raised it year by year.

Under the guidance of the MEE, the project team proposes to work with the State-owned Assets Supervision and Administration Commission of the State Council, the State Meteorological Administration and the Ministry of Emergency Management, to formulate measures for managing corporate climate finance risks in China. It is suggested that in the research process of this consulting report, the key points that should be understood are:

[178] CDP. (2017). Commit to putting a price on carbon. CDP. Available at: https://www.cdp.net/en/campaigns/commit-to-action/price-on-carbon

[179] Shell. (2020). Shell's ambition to be a net-zero emissions energy business. Shell. Available at: https://www.shell.com/energy-and-innovation/the-energy-future/shells-ambition-to-be-a-net-zero-emissions-energy-business.html

[180] Shell. (2019). CDP Climate Change 2019 Information Request – Royal Dutch Shell plc. Shell. Available at: https://www.shell.com/sustainability/sustainability-reporting-and-performance-data/performance-data/greenhouse-gas-emissions/_jcr_content/par/tabbedcontent/tab/textimage.stream/1564572084204/fbfb66b7e35c8ee49204f6e53be4a0144e35d275/climate-change-submission-royal-dutch-shell-final-31.pdf

[181] EIB. (2019). EIB Environmental and Social Handbook. EIB. Available at: https://www.eib.org/attachments/strategies/environmental_and_social_practices_handbook_en.pdf

- Whether the mode of international enterprises to manage physical risks can be widely applied in China;
- How to distinguish the types of enterprises affected by climate risks, such as fossil energy production enterprises, fossil energy use enterprises, and climatic physical risk vulnerability enterprises;
- Discuss whether the various scenarios of corporate climate risk need to be consistent with the climate risk standards of financial institutions - enterprises need to understand financial risks when managing climate risks;
- How to encourage enterprises to adopt and set a reasonable internal carbon price to avoid the risk of climate transformation resulting in asset impairment, or even production disruption;
- Whether the state should establish a systematic climatic physical risk model to help enterprises judge the impact of climatic physical risk on investment and operation, and encourage enterprises to prevent and control major risks and hidden dangers of indirect economic losses such as product safety, or whether it should be left to markets and businesses, with the state providing only policy guidance;
- How to support small and medium-sized enterprises (SMEs) that are not capable of establishing climate risk assessment models to carry out climate risk management, for example, small factories built on the coast may be exposed to the risk of sea-level rise; and how to find strategies and means to help SMEs to cope and prevent risks.

3.5 Factors to be taken into account in standard-setting

Section (3) and Section (4) of this chapter mainly introduce how to include the key points of climate investment and finance standards under the relevant sub-standards of China's green

finance standards system. It also looks at the potential demands and key considerations of relevant standards of climate investment and financing, independent of China's green finance standards system. However, climate investment and finance work involves many industries, such as finance, energy, environmental protection, construction, transportation, forestry, and urban construction. In addition to green finance standards, it is also related to industry standards, technical standards, and even enterprise standards and industry standards in other related fields in China. Therefore, when carrying out the construction of China's climate investment and finance standards system, it is also necessary to consider how to connect with these other standards and understand the requirements of the connection between the standards. In addition, due to the international nature of the work on climate change and the concept of "community with a shared future for mankind" that China adheres to in its development, the construction of climate investment and finance standards in China also needs to take into account the current - or future - requirements of how to integrate with international climate investment and finance standards. Therefore, based on sections (3) and (4), this section will carry out further discussions and make suggestions on the requirements for the convergence of climate investment and finance standards with other domestic standards and the main considerations involved in the convergence with international standards.

3.5.1 Link with other national standards

Climate investment and finance work involves many industries, such as finance, energy, environmental protection, construction, transportation, forestry, urban construction and other fields. According to a report by Xinhua News Agency in 2016[182], there are currently more than 11,000 mandatory national, industrial and local standards in China. The statistics do not include broad industry or business standards, such as regulations for a job or implementation guidelines.

[182] Xinhua News. (2016). Interpretation of 'The Notice on the Work Plan of Mandatory Standards Integration and Simplification by the State Council General Office' (解读《国务院办公厅关于印发强制性标准整合精简工作方案的通知》). Available at: http://www.gov.cn/zhengce/2016-02/15/content_5041383.htm

According to Li Pengcheng, Director of the Energy Conservation and Low-carbon Office, Resources and Environment Branch of Standalisation Administration of China, there are more than 1,000 green-related standards in China[183]. Therefore, in the process of building China's climate investment and finance standards, it is necessary to take into full consideration the existing standards of various industries and groups, especially those related to energy conservation and low-carbon, to avoid conflicts with these current standards and promote the high-quality development of all relevant industries through the combination of climate investment and finance standards and industry standards.

In connection with industry and group standard work, the project team suggests that under the guidance of the MEE and the Standardisation Administration of China that a working group on climate investment and finance standards should be set up to coordinate and liaise with relevant industry associations. In the demand assessment of linking China's climate investment and finance standards with industry and group standards, it is suggested that the focus should fall on the following points:

- How to ensure that relevant standards of climate investment and finance do not conflict with industry and group standards;
- Actively explore the inclusion of some climate investment and finance standards into the existing green finance and other relevant standards systems;
- How to promote industry experts and enterprise managers involved in climate investment and finance to participate in the construction of climate investment and finance standards;
- Whether the opinions of relevant departments should be taken into full consideration if the sub-items in the climate investment and finance standards involve other

[183] Li P. (2020). The key issue of climate investment and financing in China: standard system construction and demand research on incentive and restraint policies. Interim meeting (14 May 2020) (中国气候投融资关键问题-标准体系建设与激励约束政策的需求研究》中期会专家建议).

professional departments, and whether the views of science and technology departments should be solicited if their technical innovation skills prove relevant;

- How to fully integrate with the support policies for the development of various industries, and form special climate policy tools and industrial policies to jointly guide additional climate benefits and support the development of the work on climate change.

3.5.2 Link with relevant international standards

The international nature of the work on climate change determines that the construction of China's climate investment and finance standards should actively consider how to integrate with the global climate investment and finance standards, now or in the future. According to the research report of the ISO14097 standard[184], in addition to ISO14097 specialised standards for climate investment and finance, there are currently 30 relevant international standards, of which six are formulated by the ISO standards working group. These include:

- ISO14007 environmental management standards: determination of environmental cost and benefit guidelines[185];
- ISO14008 monetary assessment of environmental impacts and related matters: principles, requirements and guidelines[186];
- ISO14080 GHG management and associated activities: framework and principles for climate action assessment methodologies[187];
- 14090 principles, requirements and guidelines for adaptation to climate change[188];

[184] 21 Investing Initiative. (2017). ISO Standard for Investment, Financing and Climate Change (ISO 14097). Working Group Scoping Document. Available at: https://2degrees-investing.org/wp-content/uploads/2017/11/ISO14097_scoping_report.pdf

[185] ISO 14007:2019. (2019). Environmental management: Determining environmental costs and benefits – Guidance.

[186] ISO 14008:2019. (2019). Monetary valuation of environmental impacts and related environmental aspects.

[187] ISO 14080:2018. (2018). Greenhouse gas management and related activities — Framework and principles for methodologies on climate actions.

[188] ISO 14090:2019. (2019). Adaptation to climate change — Principles, requirements and guidelines.

- ISO/AWI 14100 green finance: evaluating green finance projects[189];
- ISO/NP 14030 environmental performance assessment of green bond projects and assets[190];
- NWIP green finance project evaluation method.

In addition, it includes 12 standards issued by other organizations, as shown in **Table 3-4**, and 14 information disclosure guidelines, as shown in **Table 3-5**.

The development experience of China's green financial standards in the past five years shows that the most significant differences between national and international standards lie in whether fossil energy should be included. International green financial standards generally do not include fossil energy, unless the fossil energy is combined with CCUS and its emission is below a certain level. However, current domestic green financial standards include clean utilisation of coal, such as the ultra-clean transformation of coal-fired power generation. Also, according to the preliminary investigation, international investors - including climate-friendly multilateral institutions such as the World Bank and the ADB - are very concerned about whether the climate-friendly investment or financing can bring additional real benefit. However, at present, the international green financial standards do not consider how to assess the additionality, or distinguish climate-friendly statistics and investment and financing with additional climate benefits.

Table 3-4 International climate investment and finance standards[191]

	Name of the standard	Concept proposed
ISOstandard	ISO 14007 - Environmental management: determine environmental cost and benefit guidelines	
	ISO 14008 - Monetary assessment of environmental impacts and related environmental aspects: principles, requirements and guidelines	

[189] ISO/AWI 14100. (Under development). Green Finance: Assessment of Green Financial Projects .

[190] ISO 14030. (Under development). Green bonds – Environmental performance of nominated projects and assets .

[191] Modified from: ISO14097. (2019). Working Group Scoping Document.

	ISO 14080 - Greenhouse gas management and related activities: framework and principles for a methodology for climate action	
	ISO 14090 - Framework for adaptation to climate change: principles, requirements and guidelines	
	ISO/NP 14030 Green bonds - specifies the environmental performance of projects and assets	Green investment
	ISO/AWI 14100 Green finance: green finance project evaluation	Green investment
Other organisations	GHG Protocol[192]	Portfolio decarbonisation
	ORSE - Carbon footprint industry guide [193]	Climate risk assessment
	CICERO[194]	Green investment Climate risk assessment
	Natural capital alliance - a supplement to the financial industry [195]	Climate risk assessment
	Portfolio carbon initiative [196]	Climate risk assessment、divestment and shareholder participation
	Science based targets [197]	Conformance assessment
	European commission senior expert group - green bond standards [198]	Green investment
	GRESBreal estate appraisal[199]	Climate risk assessment
	China's green bond regulation	Green investment
	Climate bond standard	Green investment
	IFIs Greenhouse gas accounting framework[200]	Climate risk assessment
	EIB Environmental and Social Practices Handbook[201]	Climate risk assessment Green investment

Table 3-5 International climate information disclosure framework [202]

	Name of the standard	Concept proposed
Standard-setting organisation	CDSB Reporting framework[203]	
	GRI- Financial industry guidelines [204]	Green investment, shareholder participation

[192] Greenhouse Gas Protocol. (2020). Standards. GHG Protocol. Available at: https://ghgprotocol.org/standards

[193] ORSE. (2020). L'Observatoire de la Responsabilité Sociétale des Entreprises (ORSE) . Available at: https://www.orse.org/

[194] CICERO. (2020). Center for International Climate Research. Available at: https://www.cicero.oslo.no/en

[195] Natural Capital Coalition. (2018). Connecting Finance and Natural Capital: A Supplement to the Natural Capital Protocol.

[196] Greenhouse Gas Protocol. Portfolio Carbon Initiative. Guidance for financial institutions to assess the climate impact from investing and lending activities.

[197] Science based targets. (2020). What is a science based targer?. Available at: https://sciencebasedtargets.org/

[198] EU Technical Expert Group on Sustainable Finance. (2019). Report on EU Green Bond Standard. EU. Available at: https://ec.europa.eu/info/publications/sustainable-finance-teg-green-bond-standard_en

[199] GRESB. (2020). The Gresb Real Estate Assessment. Available at: https://gresb.com/gresb-real-estate-assessment/

[200] The World Bank. (2020). Documents & Reports. IFI approach to GHG accounting for renewable energy projects (English). Available at: http://documents.worldbank.org/curated/en/758831468197412195/IFI-approach-to-GHG-accounting-for-renewable-energy-projects

[201] EIB. (2019). EIB Environmental and Social Handbook. EIB. Available at: https://www.eib.org/attachments/strategies/environmental_and_social_practices_handbook_en.pdf

[202] Modified from: ISO14097. (2019). Working Group Scoping Document.

[203] CDSB. (2019). Framework for reporting environmental and climate change information. CDSB.

[204] GRI. (2020). GRI Standards Download Center. Available at: https://www.globalreporting.org/standards/gri-standards-download-center/?g=812bcb42-0e95-4e7c-a1b3-8827d1a9f148

	SASB Financial supplement[205]	Climate risk assessment, green investment, shareholder participation
NGO	AODP investigation[206]	Climate risk assessment, green investing, shareholder engagement, climate lobbying, divestiture/exclusion, portfolio decarbonization
	CDP Climate change questionnaire survey[207]	Climate risk assessment, climate lobbying
Industry	TCFD[208]	Climate risk assessment, shareholder participation, portfolio decarbonization
	JSE Socially responsible investment index[209]	
	SGX, policy statement and guidance on sustainability reporting for listed companies [210]	
	Green Bond Principles	Green investment
	BM & FBOVESPA Corporate sustainability index（ISE）[211]	
Policymakers and regulators	Article 173 of the energy transformation act of France [212]	Climate risk assessment, green investment, shareholder participation, divestiture/exclusion, climate target conformance assessment
	Climate-related disclosure incentives for international investors [213]	Climate risk assessment, shareholder participation, climate target conformance assessment, green investment, portfolio decarbonization
	SEC guidelines on disclosure related to climate change [214]	Climate risk assessment
	NAICS Insurer climate risk disclosure investigation[215]	Climate risk assessment

The research team suggests that China's construction of climate investment and finance standards should be linked with international standards. It is recommended that when exploring the convergence with international standards, the following aspects should be taken into consideration:

[205] SASB. (2018). Standards Overview. Available at: https://www.sasb.org/standards-overview/

[206] AODP. (2018). Despite widespread backing, less than 20% of global pension funds intend to report aligned with TCFD. AODP. Available at: https://aodproject.net/despite-widespread-backing-less-than-30-of-global-pension-funds-intend-to-report-aligned-with-tcfd/?highlight=survey

[207] CDP. (2020). CDP Climate Change 2020 Questionnaire. CDP. Available at: https://guidance.cdp.net/en/tags?cid=13&ctype=theme&gettags=0&idtype=ThemeID&incchild=1&microsite=0&otype=Questionnaire&page=1&tgprompt=TG-124%2CTG-127%2CTG-125

[208] TCFD. (2020). Task Force on Climate-related Financial Disclosures. Available at: https://www.fsb-tcfd.org/

[209] JSE. (2020). Socially Responsible Investment index. Available at: https://www.jse.co.za/services/market-data/indices/socially-responsible-investment-index

[210] Singapore Exchange Ltd. SGX Policy Guide to, Sustainability Reporting for Listed Companies. Singapore Exchange Ltd.

[211] BM & FBOVESPA. Corporate Sustainability Index (ISE). BM & FBOVESPA.

[212] Novethic. (2016). Article 173 of the French Energy Transition Law: Implications, First Steps and Impact.

[213] Eurosif. (2016). International Award on Investor Climate-Related Disclosures. Eurosif. Available at: http://www.eurosif.org/international-award-on-investor-climate-related-disclosures/

[214] Securities and Exchange Commission. (2010). Commission Guidance Regarding Disclosure Related to Climate Change. Securities and Exchange Commission.

[215] NAIC. (2010). Insurer Climate Risk Disclosure Survey. NAIC. Available at: https://www.state.nj.us/dobi/bulletins/blt10_11survey.pdf

- Under the condition of an in-depth review of the international standards system for green finance and climate investment and finance, how to support Chinese experts and research institutions to set up research centres to track and evaluate standards related to global climate investment and finance;
- Due to China's climate and finance standards being a part of China's green financial standards, whether to achieve convergence with international standards, such as refusing fossil energy investment, refusing coal investment or excluding fossil energy projects without CCUS in climate-friendly projects;
- After summarising the limitations of current standards on green finance and international climate investment and finance, how to propose more suitable standards for optimising the application of climate finance and policies;
- Whether to take additionality as the core index of climate benefit assessment; and how to assess the impact of different Chinese climate investment and finance sub-standards on additional climate benefits;
- Whether it takes into account China's national conditions and the actual situation of developing countries; and how to study a standards system that can link international climate-friendly finance and policies;
- How to encourage Chinese institutions to promote China's forward-looking and high-quality standards for climate investment and finance in the international community.

Chapter IV. Preliminary Conclusions and Suggestions

Climate change is a major challenge facing all humankind. Actively addressing climate change is an important manifestation of the international dimension of ecological civilisation and a crucial link to the initiative of building a community with a shared future for mankind. The development of climate investment and finance is conducive to the realisation of the goal of addressing climate change and the healthy and high-quality development of the industry. The interim research report provides suggestions on the composition of the climate investment and finance standards system, as well as the demands and concerns of potential users for each sub-standard. **We plan to extensively collect suggestions from standards users and experts through questionnaire survey and teleconference, to provide research suggestions for the construction of China's climate investment and finance standards.**

The report carried out a preliminary study on the construction demands of China's climate investment and finance standards system, reviewed the domestic and international climate investment and finance standards, and drew on the experience of China's green finance standards system. The research team suggests that, as an important part of China's green finance standards system, eight basic principles should be explored in the development of China's climate investment and finance standards: **i)** user-orientation; **ii)** clear objectives; **iii)** unified principles and distinct levels; **iv)** unity of concept; **v)** clear rights and responsibilities; **vi)** explicit quantification; **vii)** climate additionality; and **viii)** commercially viable**.**

At present, China is still a developing country and may become a developed country in the next decade. The development of China's climate investment and finance standards should not only focus on China's current national conditions but also ensure that China remains forward-looking in addressing climate change in the medium- to long- term. The project team proposes to use the timelines of China's Five-Year Plan to carry out the work step by step and

complete the construction of China's climate investment and finance standards system through three Five-Year Plans (as shown in Table 4-1).

In Phase 1 (2020-2025), China's 14th FYP period, the construction of China's climate investment and finance standards system should be user-oriented and give full play to the two functions of government and the market. It should achieve the linkage between climate investment and finance sub-standards and green financial sub-standards, see the launch of climate investment and finance standard capacity building, and clarify weather and climate additionality assessment evaluation methods. At the beginning of this stage, it is necessary to complete the work plan for the standards system construction, including climate investment and finance terminology, classification and industry catalogue, and standard coding. It needs to complete climate benefit measurement methods and reporting guidelines - including climate benefit assessment methods and additionality assessment methods - as well as finalise the directory of guidance for NDC projects, and complete the identification and classification of climate finance.

In the first stage, **it is suggested that China's climate investment and finance standards actively connect with China's green financial standards system, and include climate credit standards and climate bonds as sub-standards of China's green financial products standards. The new standards should also distinguish between "climate-friendly statistics" and "climate-impacted financial products" with additionality.** There is a range of other tasks to complete during this critical first phase. They included: the evaluation of climate-friendly financial institutions as part of China's green evaluation and certification standards; the disclosure system of climate information for listed companies and financial institutions, and establish the disclosure method of climate benefits for key NDC projects as part of China's green financial information disclosure standard; add the climate finance

Table 4-1 Requirements of China's climate investment and finance standards system and suggestions on completion time

Category	Primary standards		Secondary standards	Timeline
1. separate standard	1.1 Standards system construction work plan (Phase 1)		- Climate investment and finance terminology	Phase 1
			- Classification and industry catalogue	Phase 1
			- Standard coding	Phase 1
	1.2 Climate benefit assessment methods and reporting guidelines (Phase 1)		- Methods for climate benefit assessment	Phase 1
			- Method of additionality assessment	Phase 1
	1.3 Directory of guidance for Nationally Determined Contribution projects (Phase 1)			Phase 1
	1.4 Identification and classification of climate funds (Phase 1)			Phase 1
	1.5 Carbon finance and derivatives standards (Phase 3)			Phase 3
	1.6 Measures for enterprise climate risk management (Phase 2)			Phase 1
2. Linking with other standards	2.1 Link with China's green finance standards system*	Green financial product service standards (Phase 1)	- Climate credit	Phase 1
			- Climate bond	Phase 1
			- Climate fund	Phase 2
			- Climate insurance	Phase 2
		Green credit rating and certification standards (Phase 2)	- Climate credit rating system	Phase 2
			- Assessment method for climate-friendly financial institutions	Phase 1
		Green financial information disclosure standards (Phase 1)	- Climate information disclosure system of listed companies	Phase 1
			- Climate information and benefit disclosure system of financial institutions	Phase 1
			- Disclosure measures for climate benefits of Nationally Determined Contribution projects (key projects)	Phase 1
		Green finance statistics and sharing standards (Phase 1)	- Climate finance statistics monitoring platform	Phase 1
			- Climate finance statistics system	Phase 1
			- Climate benefit statistics	Phase 1
		Management and insurance of green finance risk (Phase 1)	- Measures for climate risk management of financial institutions	Phase 1
			- Regulatory standards for climate risk in financial institutions	Phase 1
	2.2 Link with international standards on climate investment and finance	link with the international ISO/DIS14097 standard (in preparation);		Phase 3
		Link with other international climate-related standards, e.g. the Green Bond Principles (GBP), the Equator Principles (EP4), the Climate Bond Standards (CBS), and climate-related standards/guidelines issued by the World Bank, the Asian Development Bank.		Phase 3
	2.3 Link with other national standards	Link with industrial standards, local standards and enterprise standards related to climate investment and finance.		Phase 1-3

Note：The phases in parentheses are the recommended completion time. Phase 1: "14th FYP"; Phase 2: "15th FYP"; Phase 3: "16th FYP".

* To speed up the work process of climate investment and finance and reduce unnecessary duplication, it is suggested that relevant contents of climate investment and finance should be supplemented in the corresponding sub-standards to be formulated in the framework of "green finance standards system". The work is recommended to be carried out under the direction of the Department of Climate Change, which will review the outcome.

statistics monitoring platform, climate finance statistics system and climate benefit statistics as part of China's green finance statistics and sharing standards; andadd climate risk management measures and regulatory standards for financial institutions as part of China's risk management and protection standards for green finance. It is suggested that at this stage, China participate in the development of international standards, especially the development of ISO/DIS14097 standards, with institutions encouraged to participate in the development of international climate investment and finance standards in a user-oriented manner. The process of the construction of the standard should also be fully connected with other relevant industry, organisation, local, and enterprise standards to avoid any implementation difficulties and economic losses that may be caused by any of the differences in standards. We recommended that research institutions be actively encouraged to carry out prospective studies for Phase 2 and 3.

In Phase 2 (2026-2030), during China's 15th FYP period, the standards construction process needs to gather the resources and capacity for climate investment and finance standards construction. Key enterprises and financial institutions should obtain climate risk management capabilities, and the establishment of China's climate adaptation benefit assessment system will be mutually recognised with relevant international standards. At this stage, **the enterprise climate risk management measures should be completed to achieve convergence with other international standards related to climate investment and finance, In addition, Chinese institutions should be encouraged to develop user-oriented standards and establish forward-looking international standards.** In the second stage, the sub-standards of climate investment and finance in China's green finance standards will be fully implemented, including the certification of the climate fund, the standards of climate insurance and the climate evaluation and recognition system. Efforts should be made to promote the convergence

between China's climate investment and finance standards and ISO/DIS14097 standards. In the process of standards construction in the second stage, it will also be necessary to fully connect with other relevant industry, group, local, and enterprise standards, and to also study and establish a database of related standards, and adopt machine-learning algorithms to follow up different types of standards in real-time. This will help to avoid implementation difficulties and economic losses caused by the differences in standards. Additionally, it is suggested that research institutions should be encouraged to carry out prospective studies on standards related to Phase 3.

In Phase 3 (2030-2035), during China's 16th FYP period, a complete Chinese standards system for climate investment and finance will be established. This period will also see the completion of the database and methodology needed for the standards system, and a continuous self-improvement mechanism for sub-standards of climate investment and finance will be formed to support the development of international standards for climate investment and finance. In the early stage of Phase 3, the standards of carbon finance and derivative products will be completed after the successful operation of China's carbon market experience for ten consecutive years, along with the pilot implementation of carbon finance and financial derivative products in some markets. At the end of this stage, the mutual recognition and connection between China's climate investment and finance standards and ISO/DIS 14097 standards will be completed. **A climate benefit database for all industries will be established, including emission data of Scope 3 in the mitigation field.** We will fully integrate China's standards for climate investment and finance with those of relevant groups and industries, and jointly promote the development of climate investment and finance through cooperation with different industries. At the end of Phase 3, a rigorous and influential Chinese climate

investment and finance standards system will be established, laying a solid foundation for climate change investment and financing and low-carbon economic development.

- The End –

Appendix 1: Questionnaire on the demands of climate investment and finance standards system

1. Background

Climate change is one of the most important and urgent issues in the world. As a responsible country, China has taken active measures to address climate change. By 2018, China had fulfilled an international commitment to cut its carbon intensity by 40-45% from 2005 levels by 2020, ahead of schedule. However, it is going to be difficult to achieve the medium - and long-term climate change targets of peaking emissions by 2030 through industrial, fiscal and tax policies alone. It is going to be necessary to fully mobilise the enthusiasm of investors and financial institutions to meet the demand for climate investment and realise efficient use of national and international climate funds.

Studying the requirements of the climate investment and finance standards system is conducive to its development and promotion. To establish a system of climate finance standards can systematically and dynamically describe the development blueprint of climate investment and the finance industry, comprehensively understand the industry development status and trend, systematically plan a standards development project, and comprehensively guide the standards implementation plan. Yet it can also be used as a basis of retrieval and application for relevant government departments, enterprises and institutions and social organisations. Meanwhile, the climate investment and finance standards system will help enterprises and financial institutions to master the assessment methods of climate benefits and additionality[216], and set a benchmark for the management of physical climate risks and climate transition risks.

[216] If a project or asset has a climate mitigation or adaptation benefit, and becomes commercially viable through labelling, then the project or asset has additionality.

However, there are no uniform standards of climate investment and finance in the world. China's climate investment and finance work is still in the initial stage, and has not established the climate investment and finance standards system or related sub-standards. The construction of climate investment and finance standards system is a complex systematic project. It is not only necessary to correctly handle the relationship between climate investment and finance standards and green finance standards, but also to find out the effective demands of stakeholders of climate investment and finance standards and make accurate efforts under the guidance of demand.

For the above reasons, CIECC jointly developed this questionnaire in collaboration with University of Edinburgh Business School, University College London, Tsinghua University Department of Earth Sciences, and UK-China (Guangdong) CCUS Centre, to solicit stakeholder demands and suggestions on climate investment and finance standards from potential users, including government departments, financial institutions and enterprises in different regions of the world and China.

2. Questionnaire

2.1 Demographic information

Q1: Which of the following best describe your institution?

- Policymaking department in China
- Financial regulatory authority in China
- Financial institution (including domestic and international financial institution)
- Enterprise (including domestic and international institution)
- Climate-friendly investor
- Other international users

- Others, please specify:

Q2: How much of your working time have you spent on "climate change" related work?

- More than 90%
- 70% to 90%
- 50% to 70%
- 30% to 50%
- 10% to 30%
- Less than 10%
- Not sure

2.2 Knowledge and understanding of climate change

Q3: How important do you think climate change is for China?

- An essential issue in the near-term
- An essential issue in the long-term
- Minor issue in the near-term
- Minor issue in the long-term
- Not an issue at all
- Not sure

Q4: How important do you think climate change is to your institution?

- Very important
- Important
- Moderate important

- Unimportant
- Not important at all
- Not sure

Q5: To what extent do you consider yourself to be familiar with China's green financial standards system?

- Very familiar
- Familiar
- General
- Only heard of it
- Unfamiliar
- Not sure

Q6: How necessary do you think it is for China to build climate investment and finance standards?

- Very necessary
- Might be necessary
- Might be unnecessary
- Very unnecessary
- Not sure

Q7: What do you think is the priority of the following standards in the construction of climate investment and financing standard system in China?

Note: if a project or asset has climate mitigation or adaptation benefits and is commercially unviable, but it could become commercially viable through labelling, then the project or asset has additionality.

	Top priority	Priority	General	Less priority	Last priority	Not sure	
Standards system construction work plan	○	○	○	○	○	○	Including climate investment and finance terminology, classification and industry catalogue, and standards code
Climate benefit assessment methods and reporting guidelines	○	○	○	○	○	○	Including climate benefit assessment methods, additionality assessment methods
Directory of guidance for Nationally Determined Contribution (NDC) key projects	○	○	○	○	○	○	For building a project directory with priority support mechanisms
Identification and classification of climate fund	○	○	○	○	○	○	-
Carbon finance and derivatives standards	○	○	○	○	○	○	-
Measures for enterprise climate risk management	○	○	○	○	○	○	-
Green financial product service standards	○	○	○	○	○	○	Including climate credit, climate bond, climate fund, climate insurance
Green credit rating and certification standards	○	○	○	○	○	○	Including climate credit rating system and evaluation method for climate-friendly financial institutions
Climate financial information disclosure standards	○	○	○	○	○	○	Including climate information disclosure system for listed companies, climate information disclosure system for financial institutions, and climate benefit disclosure measures for NDC projects (key projects)
Climate finance statistics and sharing standards	○	○	○	○	○	○	Including climate finance statistics monitoring platform, climate finance statistics system and climate benefit statistics
Climate finance risk management and insurance	○	○	○	○	○	○	Including measures for managing climate risks of financial institutions, and regulatory standards for climate risks of financial institutions

Q8: To what extent do you agree that the following climate investment and finance standards should be part of the green finance standards?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Not sure
The climate credit standards are part of the green credit standards	○	○	○	○	○	○
The climate bond standards are part of the green bond standards	○	○	○	○	○	○
The climate fund standards are part of the green fund standards	○	○	○	○	○	○
The climate insurance standards are part of the green insurance standards	○	○	○	○	○	○
Climate assessment and identification standards are part of green assessment and identification standards	○	○	○	○	○	○
The climate information disclosure standards are part of the green financial information disclosure standards	○	○	○	○	○	○
Climate statistical standards (including statistical monitoring platforms, statistical systems and statistical methods of climate benefits) are part of the green finance statistical standards	○	○	○	○	○	○
Measures of climate finance risk management are part of the green finance risk management and assurance standards	○	○	○	○	○	○

Q9: Which of the following do you consider is closest with your opinion on the link of China's climate investment and finance standards with international climate investment and finance standards?

- China's climate investment and finance standards should be formulated within the national context and should not consider the link with international standards.

- China's climate investment and finance standards should both be domestically oriented and be internationally linked.

- China's climate investment and finance standards should be linked with international standards as the priority.

- China's climate investment and finance should meet the needs of different users, fulfil the demands of both domestic and international users.
- Others, please specify: _
- Not sure

2.3 Demand analysis of user-oriented climate investment and finance standards

Q10: What do you think are the main requirements for China to build a standards system for climate investment and finance? (for government department and regulators) (you may tick more than one option)

- To achieve the national climate change goals and the medium - and long-term low-carbon development goals; meanwhile, enhance the research and technological capabilities to drive industrial development and create new drivers for growth, thereby to improve China's international image and impact in climate change.
- To guide climate funding to invest efficiently in climate-friendly projects.
- To promote climate-friendly projects that are exemplary and forward-looking.
- To encourage enterprises and financial institutions to actively manage climate risks and contribute to the achievement of the goals of the NDC goals.
- To assist enterprises and financial institutions in avoiding investments in high-carbon intensity and climate-vulnerability projects.
- Not sure
- Others, please specify_

Q11: What do you think your organisation's demand is for the climate investment and finance standards system? (for financial institutions) (you may tick more than one option)

- To help increase business revenue and investment returns
- To improve climate risk management and mitigate climate risk
- To identify climate-friendly projects for investors from a social responsibility perspective
- To assist in achieving national policy objectives, and strengthen coordination with the government
- To promote international cooperation and increase exposure in China.
- Not sure
- Others, please specify_

Q12: What are your demands for the climate investment and finance standards system? (for enterprises) (you may tick more than one option)

- To increase the return on investment
- To enhance climate risk management
- To improve corporate image
- To strengthen the links with the government and industry that related to climate investment and finance
- Not sure
- Others, please specify_

Q13: Which of the following principles of climate investment and finance standards system do you agree with? (you may tick more than one option)

- User-oriented: demand from users should be considered, as the need for standards varies from institution to institution.

- Clear objectives: the standards need to address medium- and long-term policy objectives for emission reduction and adaptation investment. The standards design needs to promote industrial transformation and serve the medium- and long-term policy objectives.

- Apply unified core principles but contain distinct levels: the climate investment and finance standards system should establish unified principles; different types of customers, in different countries, the target of climate investment and finance standards service is different, and the details of the standards vary.

- coherent concept: climate investment and finance involves a wide range of industries and financial service institutions, and the key concepts need to be defined in a coherent way. The consistent reduces the uncertainty in setting standards and ease the execution process.

- well defined rights and responsibilities: climate investment and finance standards involve different parties. The rights and responsibilities of all parties need to be clearly defined to promote the construction of standards and encourage long-term development.

- Consistent quantification method: currently, there is no universal approach to account for emissions reduction and climate adaptation in the green financial system. As for how to calculate emissions reduction, there are many different calculation methods in academia and government. There is no widely agreed international model for assessing adaptation investment, which needs to be further studied.

- Climate additionality: to fully utilise the limited climate-friendly funding and maximise the impact of climate support policies, the standards system needs to distinguish climate-friendly statistics or climate-friendly impact. The system needs to encourage public policies and concessional financing to generate real and additional climate benefits.

- Commercially viable: climate investment and finance standards need to be commercially viable, and the costs of verification and execution need to be controlled.

- Not sure

- Other principles or recommendations, please specify: _

Q14: How long do you think it will take to build China's climate investment and finance standards system?

- Within 2 years
- 2 to 5 years
- 5 to 10 years
- 10 to 15 years
- 15 to 20 years
- More than 20 years
- Not Sure

2.4 Sub-standard survey -- separately formulated climate investment and finance standards

Q15: Which of the following categories do you consider should be taken into account when formulating the classification and industry catalogue of climate investment and finance? (you may tick more than one option)

- Green Industry Directory (NDRC, China)
- China Green Credit Guidelines (CBRC (now CBIRC), China)
- Green Bond Guidelines (PBOC, China)
- The EU Sustainable Finance Classification (EU Commission)
- ICMA Green Bond Guidelines (ICMA)
- Climate Bonds Standard (CBI)
- Not sure
- Others, please specify_

Q16: Which of the following types of emissions do you think should be considered in developing a carbon emission reduction measurement, reporting and verification system? (you may tick more than one option)

- Scope 1 (direct emissions), such as direct emissions from a steel plant.
- Scope 2 (indirect emissions), such as the emissions generated from purchased electricity in a steel plant.
- Scope 3 (Indirect emissions from non-energy consumption), such as the emissions generated in the process of construction, raw material supply and consumption in a steel plant.
- Not sure
- Others, please specify_

Q17: What do you think are the key factors to consider when formulating the climate mitigation benefit measurement method? (you may tick more than one option)

- Absolute emission only
- Relative emission reduction only
- Primarily apply absolute emission reduction method, while taking into account relative emission reduction
- Primarily apply relative emission reduction method, while taking into absolute emission reduction
- Highlight additional innovation benefit of emission reduction technology
- Highlight additional emission reduction benefit
- Others, please specify_
- Not sure

Q18: If a list of the key climate-friendly demonstration project is identified through climate investment and finance impact standards, do you suggest providing policy incentives or concessional finance for these projects?

- Both policy incentives and concessional finance are needed
- Only policy incentives are needed
- Only concessional finance is needed

- Neither policy incentives nor concessional finance is needed, but the market will resolve
- Not sure

Q19: What indicators do you consider important in the selection process of key projects supported by climate investment and finance? (you may tick more than one option)

- Climate benefits
- Technological advancement
- Demonstration effect (the project is new and replicable)
- Investment and financing model
- Other social benefits
- Others, please specify_
- Not sure

Q20: Which of the following options best describe your opinion on the needs for research on carbon finance and carbon market-related derivatives standards?

- Very necessary in the short term (e.g. improve market liquidity, strengthen price discovery ability)
- Not necessary in short-term, but essential in long-term (e.g. need to wait until the national carbon market is working smoothly)
- No need in the near-term nor the long-term (e.g. consider the risks of derivative trading)
- Others, please specify_
- Not sure

Q21: To what extent do you agree to develop carbon finance and carbon market-related derivatives standards from the following aspects?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Not sure
Review the development experience and lessons of international carbon finance and derivatives.	○	○	○	○	○	○

Analysis of China's existing domestic carbon emission allowance related mortgage financing and carbon forward businesses in pilot carbon markets.	○	○	○	○	○	○
Research on risk management of carbon finance and derivatives to understand the demand of enterprises and financial institutions for carbon finance and carbon market-related derivatives.	○	○	○	○	○	○
Analyse how the development of carbon finance and carbon market derivatives drive actual emissions reductions; research the climate additionality of developing and trading new derivatives, to promote achieving NDCs.	○	○	○	○	○	○
Define the regulatory approach to the issuance and trading of carbon finance and derivatives.	○	○	○	○	○	○
Research on applying blockchain technology to improve the accuracy of MRV and ultimately to enhance the integrity of CCER and related derivatives in the carbon market	○	○	○	○	○	○

Q22: Do you have any other suggestions for the development of standards for carbon finance and derivatives?

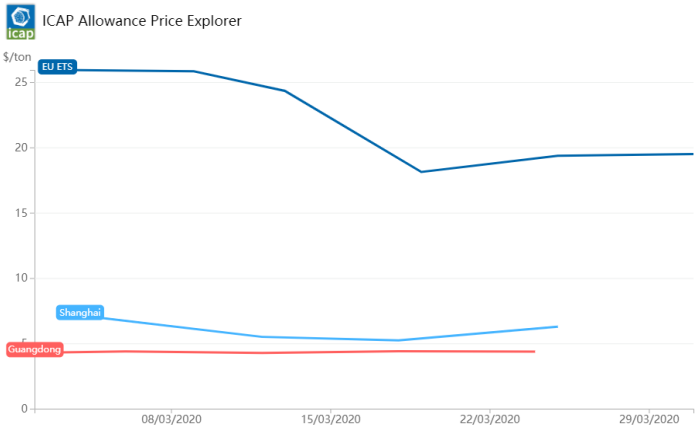
- Yes, please specify: _

- No further suggestion.

Q23: How do you predict the emission allowance price in China's carbon market in 2025?

Note: The average allowance price in the EU ETS in March 2020 is USD 22/tCO_2, equivalent to CNY 157 /tCO_2; the average allowance price in the Shanghai pilot ETS is USD 7/tCO_2, equivalent to CNY 50/tCO_2; the average allowance price in the Guangdong pilot ETS is USD 5/tCO_2, equivalent to CNY 36/tCO_2.

- Below USD 10/tCO_2
- USD 10 to 50/tCO_2
- USD 50 to100/tCO_2
- USD 100 to 200/tCO_2
- Above 200/tCO_2
- Not sure



Q24: Which of the following options about the additionality (e.g. additional climate benefits) of climate investment and finance products or services standards (such as climate bond, climate credit, climate fund) is closest to your thoughts?

- The work of climate investment and finance requires full consideration of additionality. Assets without additionality should not be labelled as climate-friendly
- Climate-friendly assets without additionality should still be labelled, but disclosure of additionality assessment result or whether additionality is assessed is required.
- No need to assess and disclosure additionality of climate investment and finance products or services at all.
- Others, please specify_
- Not sure

Q25: Which of the following options is closest to your thoughts of the enterprise climate risk management standards requirements?

- The enterprise climate risk management standards shall define the framework only, and the risk management model should be developed by the enterprises according to their own needs.

- The state should develop an enterprise climate risk management model and provide it for enterprises.

- There is no need to establish enterprise climate risk management standards, and enterprises shall carry out risk management by themselves.

- Enterprises do not need to conduct climate risk management.

- Others, please specify_

- Not sure

2.5 Sub-standards survey -- climate investment and financing standards linked with green finance standards

i. Climate product standards

Q26: At the current stage (2020-2025), to what extent do you agree to develop the following standards for climate finance products?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Not sure
Climate Credit	○	○	○	○	○	○
Climate Bond	○	○	○	○	○	○
Carbon Finance (Carbon Market-related Products)	○	○	○	○	○	○
Climate Fund	○	○	○	○	○	○
Climate Insurance	○	○	○	○	○	○
Climate Stock Index	○	○	○	○	○	○
Other innovative climate products	○	○	○	○	○	○

Q27: At the current stage (2020-2025), would you suggest your organisation to carry out the following climate investment and finance business? (for financial institutions)

	Issue with priority	Issue with less priority	Neutral	Postpone issuance	No issuance	Not sure
Climate Credit	○	○	○	○	○	○

Climate Bond	○	○	○	○	○	○
Carbon Finance (Carbon Market-related Products)	○	○	○	○	○	○
Climate Fund	○	○	○	○	○	○
Climate Insurance	○	○	○	○	○	○
Climate Stock Index	○	○	○	○	○	○
Other innovative climate products	○	○	○	○	○	○

Q28: At this stage (2020-2025), do you think it is necessary to develop climate credit standards?

- Necessary, climate credit should be carried out within the green credit system;
- Necessary, should establish climate credit standard in addition to the current green credit standard;
- Unnecessary;
- Others, please specify_
- Not sure

Q29: Do you agree to develop climate credit standards from the following aspects (as part of green credit standards)?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Not sure
Establish a white list of "climate-friendly credit statistics."	○	○	○	○	○	○
Establish a certification system of Climate Impact Bond with significant climate benefits	○	○	○	○	○	○
Establish a "climate blacklist" for credit assets with high climate risk	○	○	○	○	○	○
Development a "credit climate risk assessment method."	○	○	○	○	○	○

Divide "climate risk brown credit" in bank loans	○	○	○	○	○	○

Q30: Do you have any other suggestions for the development of climate credit standards?

- Yes, please specify: _

- No other suggestion.

Q31: At the current stage (2020-2025), which of the following options is closest to your opinion on the development of climate bond standards?

- Necessary to formulate climate bond standards within the green bond system;

- Necessary to formulate climate bond standards, and suggested to classify climate-friendly bond out of the green bond system;

- Need to establish a climate evaluation method for all bonds, and there is no need to establish "climate bond" product standards;

- It is unnecessary to formulate climate bond standards

- Others, please specify_

- Not sure

Q32: To what extent do you agree developing climate bond standards from the following aspects?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Not sure
Develop climate-evaluation standards within green bonds standards	○	○	○	○	○	○
Develop climate evaluation standards applicable for all bonds	○	○	○	○	○	○
Separate statistics of climate-friendly related bond varieties, highlighting "climate Impact bonds" with real additional climate benefits	○	○	○	○	○	○
Government fiscal policies and multilateral institutions' concessional funding support only the issuance of	○	○	○	○	○	○

"climate impact bonds" (avoid applying policy for projects that are already commercially viable)						
Establish a post-issuance fund use monitoring, reporting and verification (MRV) mechanism to ensure that funds are used for monitoring activities claimed to generate additional climate benefits	○	○	○	○	○	○

Q33: Do you have any other suggestions for the development of climate bond standards?

- Yes, please specify: _
- No further suggestion

Q34: At the current stage (2020-2025), which of the following is most in line with your opinion on the climate fund assessment and classification standards and the formulation of the certification system?

- It is necessary to develop climate fund standards;
- It is necessary to develop climate fund standards, and to establish the assessment system for climate benefit (including additional climate benefit of funds) of climate funds;
- There is no need to develop such standards;
- Others, please specify_
- Not sure;

Q35: To what extent do you agree to develop climate fund standards from the following aspects (as part of the green fund standards)?

Note: Climate Impact Fund: Climate fund with significant climate benefits and additionality

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Not sure
Conduct climate-friendly investment statistics for funds (including the amount of investment and the climate benefits),	○	○	○	○	○	○

without consideration of additional climate benefit						
Conduct climate impact funds certification, identify and monitor climate funds with significant climate benefits and additionality	○	○	○	○	○	○
Evaluate and monitor funds that claim to strictly avoid high-carbon investments	○	○	○	○	○	○
different climate fund standards should be developed, according to different types of climate funds	○	○	○	○	○	○

Q36: Do you have any other suggestions for the development of climate fund standards?

- Yes, please specify: _
- No further suggestion

Q37: Would you recommend that climate funds shall disclose portfolio and climate benefits? (you may tick more than one option)

- Disclose portfolio and climate benefits to financial regulators or climate fund certification bodies
- Disclose portfolio and climate benefits to research institutions
- Disclose portfolio and climate benefits to investors
- Disclose portfolio and climate benefits to public
- Disclose whether the investments generate real additional climate benefits
- Report or disclose of information is not recommended
- Others, please specify_
- Not sure

Q38: At the current stage (2020-2025), which of the following is most consistent with your view on the formulation of standards for climate risk insurance assessment and claim?

- It is necessary to formulate the standards, and implement within the green insurance standard;

- It is necessary to formulate the standards separately;

- It is not necessary to formulate the standards;

- Others, please specify_

- Not sure

Q39: To what extent do you agree with the following considerations for the development of climate insurance standards (as part of the green insurance standard)?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Not sure
Explore and apply innovative insurance models to slow-occurring events caused by climate change (such as the impact of melting glaciers)	○	○	○	○	○	○
Encourage market to discover positive incentives for climate risk and climate insurance costs, such as insurance companies offering lower premiums for projects with excellent climate risk management measures	○	○	○	○	○	○
Enhance post-hoc assessment capacity, to gain insight into climate risk impacts and best practices of risk mitigation	○	○	○	○	○	○
Establish an information exchange platform on climate risk insurance information	○	○	○	○	○	○

Q40: Do you have any other suggestions for the development of climate insurance standards?

- Yes, please specify: _

- No further suggestion

ii. Climate credit rating and certification standards

Q41: At the current stage (2020-2025), which of the following is most in line with your opinion on the development of climate credit rating and climate-friendly certification standards?

- Climate credit rating and certification are very important, and relevant standards should be formulated at the current stage.
- There is no urgency at this stage, but it is necessary for the long-term.
- There is no need to establish relevant standards
- Others, please specify_
- Not sure

Q42: Which of the following is closest to your opinion on the necessities for institution climate-friendly rating and certification standards? (you may tick more than one option)

- Distinguish climate finance from other green finance, sustainable finance and ESG projects, which will help guide the targeted investment in addressing climate change
- Highlight "climate-friendly" financial institutions and improve investor trust
- Climate assessment and identification can highlight additional climate benefits of climate investment and finance
- Others, please specify_
- Not sure

Q43: To what extent do you agree to carry out institution climate-friendly rating and verification work from the following aspects?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Not sure
Study and formulate institution climate-friendly rating and identification methods, and give enterprises incentive policies with a high rating	○	○	○	○	○	○

Study and formulate rating and identification methods for climate-friendly financial institutions and enterprises, establish an institution climate-friendly rating blacklist for enterprises and financial institutions, and formulate relevant disciplinary measures	○	○	○	○	○	○
The quality and reliability of climate information disclosure directly impacts the credibility and international influence of China's activities in combating climate change	○	○	○	○	○	○

Q44: Do you have any other suggestions for the development of institution climate-friendly rating and certification measures?

- Yes, please specify: _
- No further suggestion

iii. Climate information disclosure standards

Q45: Which of the following options best describe your view on the necessities for climate information disclosure?

- Necessary to develop climate information disclosure standards at the current stage
- Necessary at this stage, but necessary to develop relevant disclosure standards in the long run
- Not necessary at this stage nor in the long-run
- Others, please specify_
- Not sure

Q46: Is there a need for your organisation to apply climate disclosure standards? (for financial institutions, listed companies and climate-friendly investors)

- Demand for the standards at the current stage
- No demand for the standards at this stage, but will have demand in the future

- No demand for the standards at this stage nor in the future
- Others, please specify_
- Not sure

Q47: To what extent do you agree with the following statement on the benefits of climate information disclosure?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Not sure
It can improve the transparency of operation and management and help monitor the use of funds raised	○	○	○	○	○	○
Help financial regulators to form an overall judgment on climate-related risks in the financial industry	○	○	○	○	○	○
Conducive to the establishment of an MRV system for climate investment and finance	○	○	○	○	○	○
Help to force enterprises to disclose environmental information, promote the valid identification of high-quality green enterprises in the capital market, allocate funds to green industries in a targeted way, and reduce investment in polluting and high-carbon intensive industries	○	○	○	○	○	○
Conducive to the statistics and sharing of climate data, and optimise climate policy	○	○	○	○	○	○

Q48: To what extent do you agree to develop the climate information disclosure standards from the following aspects?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Not sure
Establish a standard form for climate risk disclosure, including indicators that must be disclosed compulsory and voluntarily	○	○	○	○	○	○
Apply a staged approach to require listed companies and owners of substantial assets to timely disclose their assets' climate risks, including physical risks and transformation risks, and conduct stress tests	○	○	○	○	○	○
Combine with climate investment and finance statistical standards to require	○	○	○	○	○	○

disclosure of climate benefits of climate-friendly assets						
Third parties are encouraged to assess the quality of information disclosure related to climate investment and finance	○	○	○	○	○	○
Give penalty to the enterprise that discloses misleading information such as climate benefits, such as affecting the records of the credit investigation system	○	○	○	○	○	○
For enterprises that receive climate financing policies support or concessional finance support, it is required to disclose whether the climate-friendly investment is additional	○	○	○	○	○	○
Apply blockchain technology to improve the accuracy of climate information reporting	○	○	○	○	○	○
Apply big data technology to assist auditing climate information reported by enterprises and financial institutes	○	○	○	○	○	○

Q49: Do you have any other suggestions for the development of climate information disclosure standards?

- Yes, please specify: _
- No other suggestion

iv. Climate risk management standards

Q50: Which of the following best describe your view about the impact of climate change on the financial system for the next ten years? (for financial institutions)

- Climate risks are significant and may trigger systemic financial risks
- Climate risks might trigger systemic financial risks
- Climate risks will not trigger systemic financial risks
- Not sure

Q51: Which of the following best describe your view on the development of climate financial risk management standards?

- At the current stage (within five years), it is necessary to formulate relevant standards
- There is no need at this stage, but it is necessary to formulate relevant standards for the long-run
- There is no need to establish relevant standards at the current stage or in the long-run
- Not sure

Q52: To what extent do you agree to develop a standard for climate financial risk from the following aspects?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Not sure
An accurate definition of various risk factors brought by climate change	○	○	○	○	○	○
Develop climate risk standards from different dimensions, including financial system, industry, city and enterprise	○	○	○	○	○	○
Governments and industry associations should encourage quantification of losses for medium - and long-term climate risks	○	○	○	○	○	○
Promote valuation in the financial systems to reflect potential additional losses arising from climate risk	○	○	○	○	○	○
Promote the actuarial departments of insurance companies and the research departments of financial institutions to research the standardisation of climate risk calculation	○	○	○	○	○	○

Q53: Do you have any other suggestions for the development of climate financial risk standards?

- Yes, please specify: _
- No further suggestion

Q54: Which of the following factors do you suggest considering when developing enterprise climate risk management measures? (you may tick more than one option)

- Review the experience and lessons of foreign enterprises in managing climate physical risks, such as floods and droughts

- Distinguish different climate risk management approaches based on the types of climate risks to which enterprises are vulnerable

- Enterprises climate risk scenarios need to be consistent with financial institution climate risk standards

- Encourage enterprises to adopt and set a reasonable internal carbon price to avoid asset impairment or even production interruption caused by the risk of climate transformation

- The state shall establish a systematic climate physical risk model to assist enterprises in determining the impact of climate physical risks on investment and operation and encourage enterprises to prevent and control major risks and hidden dangers of indirect economic losses such as production safety

- To assist small and medium enterprises without the capacity to build climate risk assessment models to address and prevent climate risks through industry associations or non-profit organisations

- Not sure

- Others, please specify _

v. Climate statistic standards

Q55: Which of the following best describes your opinion on the development of standards for climate investment and finance statistic?

- It is necessary to formulate climate statistical standards, which are conducive to quantifying China's efforts to address climate change, standardising the development of climate investment and finance, and supporting and ensuring the implementation of

incentive support policies

- Not necessary at this stage, but necessary in the long-term
- Not necessary at this stage nor necessary in the long-term
- Not sure

Q56: To what extent do you agree with the following key considerations in the construction of statistical standards for climate investment and finance?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Not sure
Provide a universal approach for climate investment and finance statistics	○	○	○	○	○	○
Establish a central statistical system for climate investment and finance	○	○	○	○	○	○
Establish a climate investment finance monitoring platform	○	○	○	○	○	○
Promote the development of climate benefit statistics methodology, i.e. GHG emission accounting methodology	○	○	○	○	○	○

Q57: Do you have any other suggestions for the development of the statistical standards for climate investment and finance?

- Yes, please specify: _
- No other suggestion

Q58: Which of the following factors do you think should be taken into consideration in formulating the statistical method of climate investment and finance?

- Establish an assessment system for climate benefits, including carbon emission levels and climate adaptation levels
- Conduce statistics on both the absolute amount and the relative emission reduction

- Distinguish projects or assets with and without additional climatic benefit because of climate investment and finance activities
- Establish climate finance statistics classifying where the funding is coming from and how the funding is being used -- from the public/commercial sector, from domestic/international, being used as grants, loans or equity investments
- The definition of "climate-friendly" needs to be in line with international norms
- Encourage classify "climate-friendly" products within a variety of green financial products and services
- Not sure

2.6 Factors to be considered in standard-setting

i. Link with international climate standards

Q59: Which of the following best describes your opinion on promoting the integration of the domestic standards system of climate investment and finance with international standards?

- Necessary, and international integration should be carried out at the initial phase of formulating standards for climate investment and finance
- Necessary, but only with the key issue, such as the definition fo climate-friendly criteria
- Not necessary at the current stage, but needs to plan to integrate with international standards in the future when China's domestic climate investment and finance standard system becomes relatively mature
- No need to link with international standards
- Others, please specify_
- Not sure

Q60: Which standards do you think should be taken into consideration in linking China's domestic standard system of climate investment and finance with the international standards? (You may tick more than one options)

- International ISO/DIS14097 standard (in progress)
- Equator Principle
- ICMA The Green Bond Principle
- CBI Climate Bond Standards
- The EU Green Bond Standard
- The World Bank-related climate finance standards
- The Asian Development Bank-related climate finance standards
- Others, please specify_
- Not sure

Q61: Which of the followings do you think should be taken into consideration when linking with international standards for climate investment and finance in China? (You may tick more than one options)

- Review the development of international standard systems for green finance and climate investment and finance, and support Chinese experts and research institutions in setting up research centres to track and evaluate global climate investment and financing standards
- Focus on some key issues, such as the use of fossil energy, rail transit, and nuclear energy, and how will China's climate investment and finance standards be aligned with international standards

- Summarise the limitations of current standards for green finance and international climate investment and finance, and propose standards more suitable for China's climate finance and policy application
- Take additionality as the main consideration of climate benefit assessment, and require all climate investment and financing standards to disclose whether they generate additional climate benefits
- Considering China's national conditions and the actual conditions of developing countries, study a standard system that can link international climate-friendly financing and policies
- Chinese institutions should be encouraged to go global and develop and promote forward-looking and high-quality standards for climate investment and finance along with international peers
- The government should encourage the promotion of international standards in the Chinese market
- Not sure
- Others, please specify_

ii. Link with other domestic standards

Q62: Which of the following options best describe your opinion on the connection between the standard system of climate investment and finance and other domestic standards (except green finance standards)? (Including industry standards, local standards, enterprise standards, group standards, and technical standards related to climate investment and finance)

- Linking with domestic standards should be carried out at the initial stage of setting standards for climate investment and finance
- Linking with domestic standards should be carried out during the process of setting

standards for climate investment and finance

- Not necessary at this stage. Should consider the coherent issue in the construction plan of the standard system and link with domestic climate investment and finance standards at a more mature stage in the future
- No need to link with other relevant domestic standards
- Others, please specify_

Q63: In your opinion, what factors should be taken into consideration in linking climate investment and finance standards with domestic industry standards, group standards, enterprise standards and technical standards? (You may tick more than one options)

- Ensure that there is no conflict between standards on climate investment and finance and industry and group standards
- Encourage related industry experts and business managers involved in formulating climate investment and finance standards
- Consult related sectoral associations or department in formulating the climate investment and finance standards
- Climate investment and finance standards should fully integrate with policies to support the development of various industries, thereby form special climate policy tools and industrial policies to jointly guide additional climate benefits and support the development of efforts to address climate change
- Others, please specify_

2.7 Other issues

Q64: Which of the following approaches may support the construction of China's climate investment and finance standards? (You may tick more than one options)

- Academic collaboration
- Industry project cooperation

- Gain financial support from international institutes
- Others, please specify_
- Not sure

Q65: Which international institutions do you think should be the focus of academic exchanges and cooperation in the construction of China's climate investment and finance standards? (You may tick more than one options)

- International policymaking departments (e.g. a related government department)
- Foreign financial regulators (e.g. central banks)
- International financial institutions (e.g. commercial banks, multilateral banks, stock exchanges)
- International enterprises
- International climate-friendly investors
- Not sure
- Other international users, please specify_

Q66: Do you agree with the involved industries and their climate benefit in Appendix 2 “Climate attribute analysis of Green Industry Catalogue”?

- Completely agree
- Partly agree, revisions needed in （ ）
- This classification is not considered meaningful and needs to be reclassified in terms of climate benefits
- Others, please specify_
- Not sure

Note: According to the relationship between industries and climate benefits, the Green Industry Catalogue of National Development and Reform Commission, we classify items in the catalogue into the following five categories (see note column for details) :

1. Conducive to carbon emission reduction/adaptation to climate change;

2. May involve climate change and need to be verified;

3. Climate change is basically not involved;

4. No climate change involved;

5. Fossil fuels involved

Q67: Do you have any other suggestions for the scoping analysis work for China's climate investment and finance standards?

- Yes, please specify: _
- No other suggestion

Q68：Would you like the research team to contact you by phone to further discuss climate investment and finance standards scoping analysis?

(Note: working hours: 9:00-17:00, non-working hours: 7:00-9:00, 17:00-20:00)

-Please contact me during working hours by phone number:

- Please contact me during non-working hours by phone number:
- Please do not contact me

Q69: Thank you for your support! Please leave your contact information, complete and submit the questionnaire to receive a small gift from the research team.

- Name：_____
- Address：_____
- Telephone：_____
- Other information：_____

Appendix 2: Climate attribute analysis of Green Industry Catalogue

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
1 Energy conservation and environmental protection industry	1.1 High efficiency and energy-saving equipment manufacturing	1.1.1 Energy-saving boiler manufacturing		x				Conducive to carbon emission reduction, it needs to be classified according to product use and needs to focus on boiler manufacturing with low carbon technology. If it is a coal-fired boiler, it will not be certified. If the gas or electric boiler, need to define the product needs to meet the full life cycle environmental standards, meet the standards of the product, to be certified
		1.1.2 Energy-saving kiln manufacturing		x				Conducive to carbon emission reduction, it is necessary to classify products according to their USES and focus on kiln manufacturing with low carbon technology. If it is a coal kiln, it will not be certified. If the gas or electric kiln needs to be defined, the product needs to meet the environmental protection standards of the full life cycle, and the products that meet the standards shall be certified
		1.1.3 Energy-saving pump and vacuum equipment manufacturing		x				Conducive to carbon emission reduction, it shall be classified according to product use. If the equipment involves high-carbon production, it shall not be certified
		1.1.4 Energy-saving gas compression equipment manufacturing		x				Conducive to carbon emission reduction, it shall be classified according to product use. If the equipment involves high-carbon production, it shall not be certified
		1.1.5 Energy-saving hydraulic pressure components manufacturing		x				Conducive to carbon emission reduction, it shall be classified according to product use. If the equipment involves high-carbon production, it shall not be certified
		1.1.6 Energy-saving fan manufacturing		x				Conducive to carbon emission reduction, it shall be classified according to product use. If the equipment involves high-carbon production, it shall not be certified
		1.1.7 High-efficiency generator and		x				Conducive to carbon emission reduction, if coal-fired generators, they will not be certified

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
		generator set manufacturing						
		1.1.8 Energy-saving motor manufacturing		x				Conducive to carbon emission reduction, if coal-fired generators, they will not be certified
		1.1.9 Energy-saving transformer, rectifier, inductor and welding machine manufacturing		x				Conducive to carbon emission reduction, equipment involving coal-fired power generation will not be certified
		1.1.10 Waste heat, pressure and gas utilisation equipment manufacturing		x				Conducive to carbon emission reduction, we need to focus on material manufacturing related to greenhouse gas emission reduction, such as energy conservation; Need to focus on material manufacturing related to GHG adaptation, such as ventilation, external shading
		1.1.11 High efficiency and energy-saving household appliances manufacturing		x				Conducive to carbon emission reduction, we need to focus on material manufacturing related to greenhouse gas emission reduction, such as energy conservation; Need to focus on material manufacturing related to GHG adaptation, such as ventilation, external shading
		1.1.12 High efficiency and energy-saving commercial equipment manufacturing		x				Conducive to carbon emission reduction, we need to focus on material manufacturing related to greenhouse gas emission reduction, such as energy conservation; Need to focus on material manufacturing related to GHG adaptation, such as ventilation, external shading
		1.1.13 High-efficiency lighting products and systems manufacturing		x				Conducive to carbon emission reduction, we need to focus on material manufacturing related to greenhouse gas emission reduction, such as energy conservation Need to focus on material manufacturing related to GHG adaptation, such as ventilation, external shading
		1.1.14 Green building materials manufacturing		Possible		Possible		May involve climate change, need to focus on the production of materials related to greenhouse gas emission reduction, such as energy conservation; Need to focus on material manufacturing related to GHG adaptation, such as ventilation, external shading

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
		1.1.15 Energy metering, monitoring and control equipment manufacturing		~~Possible~~			x	No climate change involved. Measuring, monitoring and controlling equipment can help monitor greenhouse gas emissions, but there is no climate benefit and even greenhouse gas emissions from the manufacturing process
	1.2 Advanced environmental protection equipment manufacturing	1.2.1 Water pollution prevention and control equipment manufacturing				Possible		Basically, nothing to do with climate change, except for the manufacture of equipment to improve the level of climate adaptation
		1.2.2 Air pollution prevention and control equipment manufacturing		Possible				It has little to do with climate change unless it involves the manufacture of equipment that emits greenhouse gases
		1.2.3 Soil pollution control and remediation equipment manufacturing					x	No climate change involved
		1.2.4 Solid waste disposal equipment manufacturing					x	No climate change involved
		1.2.5 Vibration and noise reduction equipment manufacturing					x	No climate change involved
		1.2.6 Equipment for the prevention and treatment of radioactive pollution		Possible				Almost nothing about climate change, except for nuclear power
		1.2.7 Environmental pollution treatment agents, materials manufacturing		Possible				Almost nothing about climate change, unless it involves carbon capture
		1.2.8 Environmental monitoring		Possible				Almost nothing about climate change, unless it involved greenhouse gases

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
		equipment and emergency treatment equipment manufacturing						
	1.3 Resource recycling equipment manufacturing	1.3.1 Equipment manufacturing for comprehensive utilisation of mineral resources					x	No climate change involved
		1.3.2 Equipment manufacturing for comprehensive utilisation of industrial solid waste		Possible				Possibly related to climate change, equipment applications need to be proven to be conducive to reducing greenhouse gas emissions
		1.3.3 Construction waste, road waste resources harmless utilisation equipment manufacturing		Possible				Possibly related to climate change, equipment applications need to be proven to be conducive to reducing greenhouse gas emissions
		1.3.4 Kitchen waste resources harmless utilisation equipment manufacturing		Possible				Possibly related to climate change, equipment applications need to be proven to be conducive to reducing greenhouse gas emissions
		1.3.5 Auto parts and mechanical and electrical products remanufacturing equipment manufacturing		Possible				Possibly related to climate change, equipment applications need to be proven to be conducive to reducing greenhouse gas emissions
		1.3.6 Resource recycling equipment manufacturing		Possible				Possibly related to climate change, equipment applications need to be proven to be conducive to reducing greenhouse gas emissions
		1.3.7 Unconventional water utilisation				Possible		Basically nothing to do with climate change unless equipped to improve climate adaptation

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
		equipment manufacturing						
		1.3.8 Agricultural and forestry waste resources harmless utilisation equipment manufacturing		Possible				Possibly related to climate change, the use of equipment needs to be proven to be conducive to reducing greenhouse gas emissions
		1.3.9 Equipment manufacturing for sludge disposal and comprehensive utilisation in an urban sewage treatment plant		Possible		Possible		Possibly related to climate change, the application of equipment needs to be proved to be conducive to GHG reduction and climate adaptation
	1.4 New energy vehicles and green ship manufacturing	1.4.1 Manufacturing and industrialisation of key components of new energy vehicles		x				It is conducive to carbon emission reduction and equipment is conducive to the transformation of a low-carbon economy
		1.4.2 Manufacturing of charging, changing and hydrogenating facilities		x				It is conducive to carbon emission reduction and equipment is conducive to the transformation of a low-carbon economy
		1.4.3 Green ship manufacturing		Possible				Possibly related to climate change, it is necessary to prove that the application of green ships is conducive to the reduction of greenhouse gas emissions
	1.5 Energy saving reconstruction	1.5.1 Energy conservation renovation and energy efficiency improvement of boilers (kilns)		x				Conducive to carbon emission reduction, it is necessary to classify products according to their USES and focus on kiln manufacturing with low carbon technology. If it is a coal kiln, it will not be certified. If the gas or electric kiln needs to be defined, the product needs to meet the environmental protection standards of the full life cycle, and the products that meet the standards shall be certified

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
		1.5.2 Energy efficiency of the motor system improved		x				Conductive to carbon emission reduction, it shall be classified according to product use. If the equipment involves high-carbon production, it shall not be certified
		1.5.3 Waste heat and pressure utilisation		x				Conducive to carbon emission reduction, it shall be classified according to product use. If the equipment involves high-carbon production, it shall not be certified
		1.5.4 Energy system optimisation		x				Conducive to carbon emission reduction, it shall be classified according to product use. If the equipment involves high-carbon production, it shall not be certified
		1.5.5 Green lighting renovation		x				Conducive to carbon emission reduction
		1.5.6 Improved energy efficiency of the turbo-generator system		Possible				Possibly related to climate change, it is necessary to study the use of steam turbine products to bring about emission reduction or emission increase. If it is related to coal, it will not be certified
	1.6 Pollution control	1.6.1 Good water body protection and prevention of groundwater environment				Possible		Potentially beneficial to climate adaptation, governance needs to be proven to be beneficial to greenhouse gas reduction and climate adaptation
		1.6.2 Improving the water environment in key river basins and sea areas				Possible		Potentially beneficial to climate adaptation, governance needs to be proven to be beneficial to greenhouse gas reduction and climate adaptation
		1.6.3 Urban black and smelly water treatment				Possible		Potentially beneficial to climate adaptation, governance needs to be proven to be beneficial to greenhouse gas reduction and climate adaptation
		1.6.4 Prevention and control of pollution from ship ports					x	No climate change involved
		1.6.5 Traffic vehicle pollution control					x	No climate change involved

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
		1.6.6 Comprehensive improvement of urban dust					x	No climate change involved
		1.6.7 Food supplier pollution control					x	No climate change involved
		1.6.8 Pollution control on construction land					x	No climate change involved
		1.6.9 Prevention and control of non-point source pollution in agriculture, forestry and grass industry		Possible		Possible		Climate change may be involved, and governance needs to be shown to be conducive to GHG reduction and climate adaptation
		1.6.10 Desert pollution control					x	No climate change involved
		1.6.11 Pollution control on agricultural land				Possible		Potentially conducive to climate adaptation, low-carbon recycling technologies need to be ensured
		1.6.12 Noise pollution control					x	No climate change involved
		1.6.13 Treatment of malodour pollution					X	No climate change involved
		1.6.14 Improvement of rural living environment					X	No climate change involved
	1.7 Resource recycling	1.7.1 Comprehensive utilisation of mineral resources		Possible				It may involve climate change and the need to ensure the use of low-carbon recycling technologies
		1.7.2 Recycling of waste resources		Possible				It may involve climate change and the need to ensure the use of low-carbon recycling technologies
		1.7.3 Comprehensive utilisation of urban and rural household waste		Possible				It may involve climate change and the need to ensure the use of low-carbon recycling technologies

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
		1.7.4 Remanufacturing of auto parts and mechanical and electrical products		Possible				May involve climate change, need to focus on the production of materials related to greenhouse gas emission reduction, such as energy conservation Need to focus on material manufacturing related to GHG adaptation, such as ventilation, external shading
		1.7.5 Desalination of seawater and brackish water				Possible		Climate change may be involved, and desalination needs to be shown to be conducive to climate adaptation
		1.7.6 The collection, treatment and utilisation of rainwater		Possible		Possible		Climate change may be involved, and governance needs to be shown to be conducive to GHG reduction and climate adaptation
		1.7.7 Recycling agricultural waste		Possible				It may involve climate change and the need to ensure the application of low-carbon recovery technologies
		1.7.8 Comprehensive utilisation of sludge in urban sewage treatment plants		Possible				It may involve climate change, which is conducive to water conservation and needs to focus on adaptation to climate change, such as water conservation
2 Cleaner production industry	2.1 Green upgrading of industrial parks	2.1.1 Industry park chain recycling transformation	Possible					May involve climate change, need to focus on the production of materials related to greenhouse gas emission reduction, such as energy conservation; Need to focus on material manufacturing related to GHG adaptation, such as ventilation, external shading
		2.1.2 Efficient transformation of resources utilisation in the park		Possible				It may involve climate change, which needs to be proven to be conducive to reducing greenhouse gas emissions
		2.1.3 Centralised improvement of pollution control in the park					x	No climate change involved
		2.1.4 Clean production transformation of		Possible				It may involve climate change, which needs to be proven to be conducive to reducing greenhouse gas emissions

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
		key industries in the park						
	2.2 Non-toxic and harmless raw material replacement use and hazardous waste treatment	2.2.1 Non-toxic and harmless raw material production and alternative use					x	No climate change involved
		2.2.2 Disposal of hazardous waste					x	No climate change involved
		2.2.3 Hazardous waste transport					x	No climate change involved
		2.2.4 High efficiency, low toxicity and low residue pesticide production and replacement					x	No climate change involved
	2.3 Production process waste gas treatment and comprehensive utilisation of resources	2.3.1 Transformation of industrial desulfurisation, denitrification and dust removal					x	Basically does not involve climate change, but desulphurisation is beneficial to carbon capture implementation
		2.3.2 Upgrading coal-fired power plants to achieve ultra-low emissions					x	Basically does not involve climate change, but desulphurisation is beneficial to carbon capture implementation
		2.3.3 Comprehensive control of volatile organic compounds					x	No climate change involved
		2.3.4 Upgrading steel enterprises to achieve ultra-low emissions					x	Basically does not involve climate change, but desulphurization is beneficial to carbon capture implementation
	2.4 Production process water saving and	2.4.1 Water saving and efficient utilisation of water		Possible		Possible		Climate change may be involved, and governance needs to be shown to be conducive to GHG reduction and climate adaptation

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
	wastewater treatment and comprehensive utilisation of resources	resources in the production process						
		2.4.2 Water pollution control in key industries				Possible		Climate change may be involved, and adaptation needs to be demonstrated
		2.4.3 Centralised control of water pollution in industrial agglomeration areas				Possible		Climate change may be involved, and adaptation needs to be demonstrated
		2.4.4 Pollution control of livestock and poultry breeding waste		Possible				Climate change may be involved, and governance needs to be shown to contribute to reducing greenhouse gas emissions, such as methane
	2.5 Treatment and disposal of waste residue in the production process and comprehensive utilisation of resources	2.5.1 Harmless treatment and comprehensive utilisation of industrial solid waste		Possible				Possibly related to climate change, it needs to be demonstrated that integrated use is conducive to reducing greenhouse gas emissions
		2.5.2 Remediation of tailings ponds					x	No climate change involved
		2.5.3 Packaging waste recycling treatment		Possible				It may involve climate change and the need to ensure the use of low-carbon recycling technologies
		2.5.4 Waste agricultural film recycling					x	No climate change involved
3 Clean energy industry	3.1 New energy and clean energy equipment manufacturing	3.1.1 Wind power equipment manufacturing		x				Help reduce greenhouse gas emissions
		3.1.2 Solar power equipment manufacturing		x				Help reduce greenhouse gas emissions

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
		3.1.3 Biomass can be manufactured using equipment		x				Help reduce greenhouse gas emissions
		3.1.4 Hydroelectricity and pumped storage equipment manufacturing		x				Help reduce greenhouse gas emissions
		3.1.5 Nuclear power equipment manufacturing		x				Help reduce greenhouse gas emissions
		3.1.6 Equipment manufacturing for unconventional oil and gas exploration and exploitation					x	When it comes to fossil energy, encouraging more fossil energy extraction will exacerbate greenhouse gas emissions
		3.1.7 Offshore oil and gas production equipment manufacturing					x	When it comes to fossil energy, encouraging more fossil energy extraction will exacerbate greenhouse gas emissions
		3.1.8 Smart grid products and equipment manufacturing		x				Help reduce greenhouse gas emissions
		3.1.9 Gas turbine equipment manufacturing					x	Involving fossil energy, to encourage the use of more fossil energy, natural gas may bring leakage
		3.1.10 Fuel cell equipment manufacturing		x				It is conducive to the transformation of a low-carbon economy
		3.1.11 Geothermal energy development and utilizsation equipment manufacturing		x				It is conducive to the reduction of greenhouse gas emissions, but the emission footprint needs to be analysed to ensure that low-carbon materials are used in manufacturing and products are used in low-energy exploitation, and the life cycle footprint is calculated

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
		3.1.12 Marine energy development and utilisation equipment manufacturing		x				It is conducive to the reduction of greenhouse gas emissions, but the emission footprint needs to be analysed to ensure that low-carbon materials are used in manufacturing and products are used in low-energy exploitation, and the life cycle footprint is calculated
	3.2 Construction and operation of clean energy facilities	3.2.1 Construction and operation of wind power generation facilities	x					Conducive to greenhouse gas emission reduction, it is necessary to ensure that low-carbon materials are used in manufacturing and products are used in low-energy exploitation to calculate life cycle footprint
		3.2.2 Construction and operation of solar energy utilisation facilities	x					Conducive to greenhouse gas emission reduction, it is necessary to ensure that low-carbon materials are used in manufacturing and products are used in low-energy exploitation to calculate life cycle footprint
		3.2.3 Construction and operation of biomass energy utilisation facilities	x					Conducive to greenhouse gas emission reduction, it is necessary to ensure that low-carbon materials are used in manufacturing and products are used in low-energy exploitation to calculate life cycle footprint
		3.2.4 Construction and operation of large hydropower facilities	x					Conducive to greenhouse gas emission reduction, it is necessary to ensure that low-carbon materials are used in manufacturing and products are used in low-energy exploitation to calculate life cycle footprint
		3.2.5 Nuclear power plant construction and operation	x					Help reduce greenhouse gas emissions
		3.2.6 Construction and operation of coal-bed methane (coal gas) extraction and utilisation facilities	Possible					There is a potential to reduce methane emissions, but coalbed methane involves coal mining
		3.2.7 Construction and operation of geothermal energy utilisation facilities	x					Is conducive to reducing greenhouse gas emissions, but needs to analyze the emissions footprint

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
		3.2.8 Marine facilities can be built and operated	x					Is conducive to reducing greenhouse gas emissions, but needs to analyze the emissions footprint
		3.2.9 Hydrogen energy utilisation facility construction and operation		x				Conducive to low-carbon economic transformation, we need to study the emission footprint of hydrogen sources
		3.2.10 Construction and operation of heat pump facilities	x					Conducive to reduce greenhouse gas emission, but needs to analyse the effect on groundwater
	3.3 Clean and efficient use of traditional energy	3.3.1 Clean fuel production					x	Related to fossil energy
		3.3.2 Clean utilisation of coal					x	Related to fossil energy
		3.3.3 Clean coal production					x	Related to fossil energy
	3.4 Energy systems operate efficiently	3.4.1 Multiple complementary engineering construction and operation	Possible					Climate change may be involved, and research needs to be done on what energy sources are involved
		3.4.2 Construction and operation of efficient energy storage facilities		x				It will help reduce carbon emissions, promote the transformation of the low-carbon economy, and help accommodate more low-carbon energy
		3.4.3 Smart grid construction and operation		x				It will help reduce carbon emissions, promote the transformation of the low-carbon economy, and help accommodate more low-carbon energy
		3.4.4 Modification and operation of peak-shifting flexibility for coal-fired power generating units					x	Involving fossil fuels, although the carbon footprint may lead to reductions in emissions

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
		3.4.5 Construction and operation of natural gas transmission, storage, transportation and peak load shifting facilities					x	Involving fossil fuels, although the carbon footprint may lead to reductions in emissions
		3.4.6 Distributed energy engineering construction and operation	Possible					Climate change may be involved, and research needs to be done on what energy sources are involved
		3.4.7 Construction and operation of pumped storage power stations		x				It will help reduce carbon emissions, promote the transformation of the low-carbon economy, and help accommodate more low-carbon energy
4 Eco-environmental industry	4.1 Ecological agriculture	4.1.1 Modern agricultural seed industry and protection of plant and animal germplasm resources			x			Conducive to the adaptation to climate change, involving biodiversity
		4.1.2 Green organic agriculture	Possible			Possible	~~x~~	It may involve climate change and needs to be proven to involve low carbon emissions reduction activities such as soil carbon sink, water-saving irrigation and biodiversity
		4.1.3 The construction and operation of protected areas for crop cultivation and protection areas				Possible		Climate change may be involved, and activities need to be demonstrated to be conducive to climate adaptation
		4.1.4 Forest resource nurturing industry	x					Conducive to carbon reduction, forest carbon sink

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
		4.1.5 Undergrowth and undergrowth aquaculture					x	No climate change involved
		4.1.6 Carbon sequestration forest, tree planting grass and forest seedlings flowers	x					Conducive to carbon reduction, forest carbon sink
		4.1.7 Conservation of forest genetic resources		Possible		Possible		It may indirectly help reduce forest carbon emissions and protect species
		4.1.8 Green animal husbandry		Possible				Possibly related to climate change, green animal husbandry needs to be defined, whether it is beneficial to reduce greenhouse gas emissions, and sustainable animal husbandry needs to be certified
		4.1.9 Green fishery				Possible		It may involve climate change, the need to define green fisheries, the possible benefits of biodiversity, and the certification of sustainable fisheries
		4.1.10 Forest recreation and recreation industries					x	No climate change involved
		4.1.11 Green control of crop diseases and insect pests		Possible		Possible		There may be indirect benefits to carbon sequestration reduction and climate adaptation
	4.2 Ecological protection	4.2.1 Protection of natural forest resources	x					Conducive to carbon reduction, forest carbon sink
		4.2.2 Conservation of animal and plant resources			x			Conducive to the adaptation to climate change, involving biodiversity
		4.2.3 Construction and operation of nature reserves	x		x			Conducive to carbon emission reduction and adaptation to climate change, involving biodiversity
		4.2.4 Construction, maintenance and	x		x			Conducive to carbon emission reduction and adaptation to climate change, involving biodiversity

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
		operation of ecological functional areas						
		4.2.5 National parks, world heritage sites, national scenic spots, national forest parks, national geological parks, national wetland parks and other protective operations	Possible					Possibly related to climate change, it is necessary to verify whether forest vegetation protection is conducive to carbon reduction and climate adaptation
	4.3 Ecological restoration	4.3.1 Project construction of returning farmland to forest and grassland and returning grazing land to grassland	x					Conducive to carbon emission reduction
		4.3.2 River, lake and wetland conservation and restoration				x		Conducive to the adaptation to climate change, involving biodiversity
		4.3.3 Proliferation and release and construction and operation of Marine ranching					x	No climate change involved
		4.3.4 National ecological security barrier protection and restoration	x					Conducive to carbon emission reduction
		4.3.5 Comprehensive management of key ecological areas	可能					It may involve climate change, and whether it is conducive to carbon reduction needs to be verified, depending on the specific content of governance
		4.3.6 Mine ecological	x					Conducive to carbon emission reduction, carbon sink

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
		environment restoration						
		4.3.7 We will comprehensively control desertification, stony desertification, and soil erosion					x	It's not about climate change but is very unlikely to be conducive to climate adaptation
		4.3.8 Pest disaster prevention and control				x		Conducive to the adaptation to climate change, involving biodiversity
		4.3.9 Prevention and control of drought and flood disasters in aquatic ecosystems			x			To adapt to climate change
		4.3.10 Treatment and rehabilitation of groundwater overdrawn areas				Possible		It may involve climate change, which is conducive to adaptation, and specific quantification of water-saving capacity needs to be clarified
		4.3.11 Comprehensive treatment of coal mining subsidence areas					x	No climate change involved
		4.3.12 Comprehensive improvement of rural land					x	No climate change involved
		4.3.13 Comprehensive improvement of sea areas, coastal zones and islands					x	No climate change involved

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
5 Green upgrade of infrastructure	5.1 Building energy conservation and green building	5.1.1 Construction of ultra-low-energy buildings	x					Conducive to carbon emission reduction
		5.1.2 Green building	x					Conducive to carbon emission reduction, it is necessary to study whether the specific design will bring about emission reduction
		5.1.3 Building renewable energy applications	x					Conducive to carbon emission reduction
		5.1.4 Prefabricated building		x				To reduce carbon emission and promote the transformation of a low-carbon economy, it is also necessary to calculate the carbon footprint of prefabricated buildings
		5.1.5 Existing building energy conservation and green transformation	x					Conducive to carbon emission reduction
		5.1.6 Logistics green storage	x					In favour of carbon emission reduction, it is necessary to study whether green storage design can bring about emission reduction
	5.2 Green transportation	5.2.1 Construction and operation of a no-parking charging system	x					Conducive to carbon reduction, but probably not very significant, need to be measured
		5.2.2 Construction of power supply facilities for ports, wharves and ports and airport Bridges					x	No climate change involved
		5.2.3 Construction and operation of container multimodal transport system					x	No climate change involved
		5.2.4 Construction and operation of an		x				Conducive to carbon emission reduction, we should measure the impact on carbon emissions

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
		intelligent transportation system						
		5.2.5 Construction and operation of facilities for charging, changing, hydrogenating and aerating		x				Conducive to carbon emission reduction and promote the transformation of a low-carbon economy
		5.2.6 Construction and operation of the urban slow-moving system		x				Conducive to carbon emission reduction, reduce the use of fossil energy
		5.2.7 Construction and operation of urban and rural public transport systems	x					Conducive to carbon reduction, public transport is good for carbon reduction
		5.2.8 Construction and operation of Shared transportation facilities	Possible					It may be related to climate change, so it is necessary to analyze whether the specific model brings about carbon emission reduction, and if the sewage treatment model reduces energy consumption, it should be certified
		5.2.9 Construction and operation of highway suspension transportation system					x	No climate change involved
		5.2.10 The construction and operation of freight railways and the upgrading of railways to conserve energy and protect the environment	x					Conducive to carbon reduction
		5.3.1 Sewage treatment, recycling		Possible				It may be related to climate change, so it is necessary to analyze whether the specific model brings about carbon

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
		and sludge treatment facilities construction and operation						emission reduction, and if the sewage treatment model reduces energy consumption, it should be certified
		5.3.2 Construction and operation of household waste treatment facilities		Possible				It may be related to climate change, so it is necessary to analyze whether the specific model brings about carbon emission reduction, and if the sewage treatment model reduces energy consumption, it should be certified
		5.3.3 Construction and operation of an environmental monitoring system					x	No climate change involved
	5.3 Environmental infrastructure	5.3.4 Urban sewage collection system screening, renovation, construction and restoration					x	No climate change involved
		5.3.5 Construction and operation of metering leakage control in an urban water supply network					x	No climate change involved
		5.3.6 The sewage outlet into the river to check and repair and standardized construction and operation				Possible		It may be beneficial for the watershed to adapt to climate change. If the operation treatment mode has reduced energy consumption and meets low-carbon standards, it will be certified
	5.4 Urban energy infrastructure	5.4.1 Clean construction, operation and renovation of urban central heating systems	Possible					May involve climate change; if the operation treatment mode energy consumption reduction, meet the low carbon standard, it shall be certified

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
		5.4.2 Intelligent construction, operation and renovation of urban power facilities		Possible				May involve climate change; if the operation treatment mode energy consumption reduction, meet the low carbon standard, it shall be certified
		5.4.3 Construction and operation of integrated energy supply facilities in cities and towns		Possible				May involve climate change; if the operation treatment mode energy consumption reduction, meet the low carbon standard, it shall be certified
	5.5 海绵城市	5.5.1 Sponge building and community construction and operation				x		To adapt to climate change
		5.5.2 Sponge road and plaza construction and operation				x		To adapt to climate change
		5.5.3 Construction and operation of sponge parks and green spaces				x		To adapt to climate change
		5.5.4 Construction, operation and renovation of urban drainage facilities to meet the standards				x		To adapt to climate change
		5.5.5 Natural ecological restoration of urban water bodies				x		To adapt to climate change
	5.6 landscaping	5.6.1 Park green space construction,	Possible					It may involve climate change, which has a weak mitigation effect and needs further study

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
		maintenance and operation						
		5.6.2 Greenway system construction, maintenance management and operation	Possible					It may involve climate change, which has a weak mitigation effect and needs further study
		5.6.3 Subsidiary green space construction, maintenance, management and operation	Possible					It may involve climate change, which has a weak mitigation effect and needs further study
		5.6.4 Road greening construction, maintenance and management	Possible					It may involve climate change, which has a weak mitigation effect and needs further study
		5.6.5 Construction, maintenance, management and operation of regional green space	Possible					It may involve climate change, which has a weak mitigation effect and needs further study
		5.6.6 Three-dimensional green construction, maintenance and management	Possible					It may involve climate change, which has a weak mitigation effect and needs further study
6 Green services	6.1 Consulting Services	6.1.1 Green industry project survey service		Possible		Possible		It may involve climate change, which has a weak mitigation effect and needs further study
		6.1.2 Green industry project design service		Possible		Possible		It may involve climate change, which has a weak mitigation effect and needs further study
		6.1.3 Technical consulting service		Possible		Possible		It may involve climate change, which has a weak mitigation effect and needs further study

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
		for green industry projects						
	6.2 Project operation management	6.2.1 Building an energy management system		x				Conducive to carbon emission reduction, through energy conservation to achieve carbon emission reduction
		6.2.2 Contract energy management services	x					Conducive to carbon emission reduction, through energy conservation to achieve carbon emission reduction
		6.2.3 Trading services with energy rights	x					Conducive to carbon emission reduction, through energy conservation to achieve carbon emission reduction
		6.2.4 Water rights trading services				Possible		It may involve climate change and improve climate adaptation by optimizing the use of water resources
		6.2.5 Emission permits and trading services					x	Climate change is not involved, but further analysis of specific transactions is needed
		6.2.6 Carbon emission trading services	x					Conducive to carbon emission reduction, through carbon trading to reduce carbon emissions
		6.2.7 Power demand-side management services	x					It is conducive to carbon emission reduction by optimizing the supply and demand of the power system
		6.2.8 Renewable energy green certificate trading service	x					Help reduce carbon emissions by incentivizing investment in renewable energy
	6.3 Project evaluation audit verification	6.3.1 Energy conservation assessment and energy audit		x				Conducive to carbon emission reduction, through energy conservation to achieve carbon emission reduction
		6.3.2 Environmental impact assessment				Possible		Climate change may be involved, and adaptation needs to be verified
		6.3.3 Carbon emission verification		x				It is conducive to carbon emission reduction by promoting high-quality development of carbon trading to reduce carbon emissions

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
		6.3.4 Hazard assessment of geological hazards					x	Climate change is not involved, but further research is needed
		6.3.5 Soil and water conservation assessment				Possible		It may involve climate change, and it needs to be verified whether it is conducive to the adaptation to climate change
	6.4 Monitoring and testing	6.4.1 Construction of online energy monitoring system		Possible				Conducive to carbon reduction, by optimizing the supply of energy may reduce carbon emissions
		6.4.2 Pollution monitoring					x	No climate change involved
		6.4.3 Environmental damage assessment and monitoring				Possible		It may involve climate change and needs to be validated for its relevance to adaptation
		6.4.4 Environmental impact assessment monitoring				Possible		It may involve climate change and needs to be validated for its relevance to adaptation
		6.4.5 Enterprise environmental monitoring		Possible				It may involve climate change if it involves greenhouse gas detection, which is conducive to carbon emission reduction
		6.4.6 Ecological environment monitoring				Possible		It may involve climate change, and if it involves relevant detection of climate adaptation, it is conducive to climate adaptation
	6.5 Technical product certification and promotion	6.5.1 Energy-saving product certification promotion		x				In favour of carbon emission reduction, indirectly promote carbon emission reduction
		6.5.2 Low-carbon product certification promotion		x				In favour of carbon emission reduction, indirectly promote carbon emission reduction
		6.5.3 Promote the certification of water-saving products		~~x~~		Possible		Conducive to the adaptation to climate change, indirectly promote climate adaptation

Classification	Level 1	Level 2	Mitigation		Adaptation		No climate benefit	Notes
			Direct	*Indirect*	*Direct*	*Indirect*		
		6.5.4 Environmental labelling product certification promotion		Possible		Possible		It may involve climate change, and it needs to be verified whether it is related to carbon emission reduction and climate adaptation
		6.5.5 Organic food certification promotion					x	No climate change involved
		6.5.6 Green food certification promotion					x	No climate change involved
		6.5.7 Product identification and promotion of comprehensive utilization of resources		Possible				Climate change may be involved, depending on the comprehensive utilization of the carbon footprint, whether it can bring about emission reduction, conducive to carbon emission reduction, need to focus on the greenhouse gas emission reduction related to the product
		6.5.8 Green building materials certification promotion		Possible				May involve climate change, conducive to carbon emission reduction, need to focus on green building materials related to greenhouse gas emission reduction, such as energy conservation Green building materials related to GHG adaptation need to be focused, such as ventilation and external shading